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The
Geographical Journal.

No. 3. SEPTEMBER, 1905. Vol. XXVI.

ON THE NILE FLOOD AND ITS VARIATION.*

By Captain H. G. LYONS, F.R.G.S., F.G.S., Director-General Survey Department, Egypt.

Several writers on the Nile have stated that a certain alternation of high and low floods can be traced. Fritz,† in discussing the maximum readings of the river gauges at Cairo and the Delta Barrage, believed that they followed the curve of sunspots; Sir W. Willcocks ‡ has stated that low Nile floods and deficient monsoons in India coincide; Sir Norman Lockyer § has argued that both Indian rainfall and Nile floods show an alternation corresponding to that of the solar weather; Sir J. Eliot ‖ has shown that a certain periodic oscillation of the atmospheric pressure occurs over India, and he connects with this similar periodical variations in the rainfall. It is, therefore, of considerable importance to determine whether there is any periodical variation in the Nile flood, whether a series of good floods is regularly followed by one of deficient floods, or whether excess and defect succeed one another irregularly. As the flood represents the run-off of an area on which the rains of the East African monsoon fall in June, July, August, and September, it is the variation of this rainfall which has in reality to be studied.

The regimen of a normal flood will first be described, and its volume

* Research Department, June 16, 1905. Communicated by permission of Sir W. Garstin, G.C.M.G., Adviser to the Public Works Ministry, Egypt. Diagrams, p. 368.

† *Meteor. Zeit.*, 1880, p. 303.

‡ Geographical Congress, Chicago, and 'The Nile in 1904,' p. 87. Cairo: 1905.

§ *Proc. Roy. Soc.*, vol. 67, p. 409.

‖ *Indian Met. Mem.*, vol. 6, pt. ii., 1896.

estimated; the unimportant part played by the White Nile water, as shown by recent observations,* is discussed at some length, since it results from it that the Abyssinian area alone is responsible for the flood supply, and the rainfall of the equatorial regions and the basin of the White Nile and the Bahr-el-Jebel may be neglected in considering the Nile flood; their effect is felt during the falling and low stages of the river.

Dates of Highest and Lowest Levels.

The Nile is at its lowest at Khartum in the middle of May, just before the White Nile begins to rise, and when the Blue Nile flood has not yet arrived. For the nineteen years 1869–1883 and 1900–1903, the average date of the lowest gauge-reading at Khartum was May 13; the extreme dates begin April 16, 1900, and May 29, 1882.

The highest level at Khartum is usually reached early in September, the earliest date in these years being August 16, and the latest September 29, 1881, when the Abyssinian rains were unusually prolonged, though they were not heavy. The mean date for the maximum deduced from these years is September 6, and the mean deviation from this date is ten days.

TABLE I.

Year.	Date of lowest reading.	Difference from mean date.	Date of highest reading.	Difference from mean date.
1869	May 19	+ 6	Sept. 5	- 1
1870	,, 20	+ 7	Aug. 17	-20
1871	,, 17	+ 4	,, 16	-21
1872	,, 8	- 5	Sept. 6	0
1873	,, 12	- 1	,, 2, 9, 10	0
1874	,, 8	- 5	,, 4, 5	- 2
1875	,, 8, 16, 25	+12	,, 20	+14
1876	,, 8, 21	+ 8	,, 12	+ 6
1877	,, 10	- 3	Aug. 29, 30	- 7
1878	,, 10	- 3	Sept. 21, 22	+16
1879	,, 10	- 3	,, 9, 10, 11	+ 4
1880	,, 13	0	,, 23	+17
1881	,, 20	+ 7	,, 29	+23
1882	,, 29	+16	Aug. 28	- 9
1883	,, 24	+11	Sept. 11	+ 5
1900	April 16	-27	Aug. 17	-20
1901	,, 18	-25	Sept. 1, 20	-11
1902	May 6	- 7	,, 14	+ 8
1903	,, 15	+ 2	,, 4	- 2

Mean date of lowest reading, May 13.
Mean date of highest reading, September 6.
Mean variation from date of maximum, ten days.

* 'A Report on the Basin of the Upper Nile,' by Sir W. Garstin, p. 164. Cairo: 1904.

At Aswan, for the series of years 1873–1902, the mean date for the lowest reading was June 1, the earliest being May 5, 1887, and the latest June 22, 1882, while the average deviation from the date was ten days. Here the mean date for the highest stage, as deduced from the thirty-four years 1869–1902, is September 4, the earliest date being August 19, and the latest being October 1, while the mean deviation from September 4 is eight days.

TABLE II.

Year.	Minimum.			Maximum.		
	Date.	After April 30.	Difference from mean date.	Date.	After August 15.	Difference from mean date.
1869		Doubtful		Sept. 4	20	0
1870	June 14	45	+13	,, 7	23	+ 3
1871	,, 16	47	+15	Aug. 18	3	-17
1872	May 25	25	- 6	Sept. 18	34	+14
1873	June 3	34	+ 2	,, 1	17	- 3
1874	May 28	28	- 4	,, 6	22	+ 2
1875	,, 23	23	- 9	,, 11	27	+ 7
1876	June 11	42	-12	,, 7	23	+ 3
1877	May 26	26	- 6	Aug. 20	5	-15
1878	June 8	39	+ 7	Oct. 1	46	+26
1879	May 23	23	- 9	Sept. 13	29	+ 9
1880	June 3	34	+ 2	,, 2	18	- 2
1881	May 14	14	-18	,, 4	20	0
1882	June 22	53	+21	Aug. 28	13	- 7
1883	May 27	27	- 5	Sept. 17	33	+13
1884	,, 25	25	- 7	,, 1	17	- 3
1885	June 20	51	+19	Aug. 28	13	- 7
1886	,, 3	34	+ 2	Sept. 22	38	+18
1887	May 5	5	-27	,, 1	17	- 3
1888	June 4	35	+ 3	Aug. 24	9	-11
1889	,, 4	35	+ 3	Sept. 1	17	- 3
1890	May 28	28	- 4	,, 2	18	- 2
1891	,, 17	17	-15	,, 7	23	+ 3
1892	June 5	36	+ 4	,, 20	36	+16
1893	,, 18	49	+17	,, 14	30	+10
1894	May 8	8	-14	Aug. 25	10	-10
1895	June 21	52	+20	,, 22	7	-13
1896	,, 11	42	+10	Sept. 2	18	- 2
1897	May 27	27	- 5	,, 1	17	- 3
1898	June 21	52	+20	Aug. 28	13	- 7
1899	,, 1	32	+ 0	Sept. 4	20	0
1900	May 26	26	- 5	Aug. 19	4	-16
1901	,, 10	10	-22	Sept. 6	22	+ 2
1902	June 6	37	+ 5	,, 17	33	+13
Mean	June 1	—	± 10	Sept. 4	—	± 8

It is noticeable that the mean date for the highest gauge-reading is two days earlier for Khartum than for Aswan, and if corresponding years are taken from the two tables, it will be found that the date of the highest gauge-reading at Aswan often precedes that of Khartum, sometimes by as much as twenty days (1880 and 1881). This is due to the Atbara river, which, being in highest flood soon after the middle of August, may, with the increasing Blue Nile flood, cause a higher reading at

Aswan than their combined waters at the time when the Blue Nile is at its maximum and the Atbara has fallen. The Atbara drains a part of Abyssinia to the north of the basin of the Abai or Blue Nile, and the rains in the northern basin decrease earlier than those of the more southern districts of Gojam and Wallega.

Beginning of Rise.—The season of lowest Nile is marked by the unusual greenness of the water, which has a marshy and putrid taste and smell, which boiling or distilling only increases. The green colour is due to large quantities of microscopic algæ * which are floating in the water, and it is the oil contained in some of these which gives the unpleasant taste and smell. Since d'Arnaud, after his visit to the Bahr-el-Jebel in 1841, attributed this algæ-laden water to the rising flood of that river which forced out of the lagoons and marshes the stagnant water which had been lying there, later writers have accepted his explanation of this "green water." It is not, however, a satisfactory one. The earliest rise of any magnitude in the Bahr-el-Jebel at Gondokoro, 4° 55′ N. lat., does not take place until June, while the green water is usually seen about Dueim, 14° N. lat., in the middle of May. Observations in particular years give the same result, and in 1902 the green water was filling the White Nile at Dueim and northwards nearly as far as Khartum on May 11, on which date the Bahr-el-Jebel at Gondokoro rose markedly for the first time that year.

The green water at Dueim in May cannot, therefore, be that which has been forced out of the marshes of the Bahr-el-Jebel by the rising flood. I have suggested * that it may be brought down the Sobat from the Pibor marshes, as the first rise of the Baro takes place in the beginning of May; but in 1903 the first rise of the river at Doleib Hilla (25 kilometres from the junction of the Sobat with the White Nile) was marked by muddy and not by green water, and in 1902 no green colour was noticed. It seems, therefore, that while these minute algæ are brought down throughout the year by the water from the marshes of the Bahr-el-Jebel and the Bahr-el-Ghazal, they do not multiply rapidly in the White Nile until conditions of hot sun and low velocity of current appear, such as occur in May. Dr. Schweinfurth has suggested that this growth of algæ may take place in the pools and backwaters of the different cataracts; and as the conditions there must be entirely favourable, it is probable that it does do so, but only to a small extent, since the area would be but small; in any case, it has not been actually observed there. Mr. T. Barron noticed in August, 1903, this same green coloration of the water at Dueim, when the White Nile water was being held up by the Blue Nile flood, and the current in the White Nile was hardly appreciable. This confirms the view that these algæ grow in the White Nile reach when conditions are favourable, and are not brought down from the marshes of the Pibor,

* Kaufmann, 'Revue de l'Egypte,' p. 105. Cairo: 1897.

since the Sobat is in August discharging 800 to 900 cubic metres per second of reddish muddy water. On reaching Egypt in June, this green water occupies a considerable length of the river—500 kilometres, according to Kaufmann, who made observations on this point in 1886. As in May the White Nile is furnishing practically the whole supply of the Nile, this green water fills the river, and becomes greener as the algæ multiply. After June the rising flood of the Blue Nile is on its way down the river, and, flowing with greater velocity than the green water, overtakes it, carrying it down before it, and producing the phenomenon of the sudden change from the green water to the muddy red-brown flood.

Rise at Khartum.—At Khartum the rise commences quickly; for a few days the gauge shows a slight increase, and then rises steadily. In most years there are small rises and falls which interrupt the steady rise, due to variations in the volume of water poured in by the different tributary streams in the upper reaches of the river. In the mean curve taken from fourteen years (1869–83), Fig. I., these irregularities do not appear, and a steady rise is shown, which varies from one metre in fifteen days at first to one metre in ten days at the end of July. In the middle of August the rise becomes slow, and the flood stage is reached usually at the end of the first week in September. The fall then commences, and by September 20 is well advanced, the gauge falling a metre in about sixteen days.

Similar mean gauge curves are given in Fig. I. for Wadi Halfa and Aswan. Though these are not for the same fourteen years as the Khartum curve, all the three probably differ but very little from the true mean curves, and may be compared with one another without introducing any error. They are similar in general character, but differ somewhat in the shape of the curve.

While the Khartum curve rises at once and with a fairly regular increase, those of Wadi Halfa and Aswan rise very slowly for the first three weeks, and then a more rapid rise takes place.

This is clearly shown in the following table, taken from the mean curves:—

TABLE III.

Days after May 20.	Rise of mean gauge at—					
	Khartum.	Rise in ten days.	Wadi Halfa.	Rise in ten days.	Aswan.	Rise in ten days.
	metres.	metre.	metre.	metre.	metre.	metre.
10	0·47	0·47	0·00	0·00	0·00	0·00
20	1·01	0·54	0·10	0·10	0·08	0·08
30	1·51	0·50	0·30	0·20	0·30	0·22
40	2·25	0·74	0·75	0·55	0·86	0·56
50	3·10	0·85	1·25	0·50	1·55	0·69

* Bluebook, Egypt, No. 1, 1903, p. 70.

The delay of the rise at Wadi Halfa is due to the amount of water which is taken up by the sandbanks and low shallow reaches when the flood first comes down. About a month's delay is caused by this, together with the move of the flood-wave from Khartum to Aswan, before the flood can be said to be rising rapidly at Wadi Halfa. The first rise is felt apparently at Wadi Halfa about fifteen days after the rise has commenced at Khartum.

The fall begins at Khartum about September 20, and at Wadi Halfa and Aswan a few days later.

Range of Flood at Khartum.—The fifteen years of gauge-readings at Khartum from 1869 to 1883 do not cover exactly the same period of each year. Though in ten years the readings begin on the 8th, 9th, or 10th of May, in the first five years it is not until the 18th or 20th, while they end on various dates from September 5 to November 8. It is not, therefore, quite certain that the absolute lowest reading of the year is recorded; but in all cases the lowest reading given must be very near it, while in every year except 1869 the maximum can be found without any doubt.*

The following table gives the lowest and highest readings recorded, together with the range for each year:—

TABLE IV.

Year.	Lowest gauge-reading.	Highest gauge-reading.	Range.
	metres.	metres.	metres.
1869	5·44	13·50	8·06
1870	5·40	13·32	7·92
1871	6·48	13·00	6·52
1872	6·52	13·21	6·69
1873	6·48	12·42	5·94
1874	6·57	13·77	7·20
1875	6·48	13·25	6·77
1876	6·48	13·50	7·02
1877	6·52	11·74	5·20
1878	6·55	14·06	7·51
1879	7·93	13·32	5·39
1880	5·82	12·80	6·90
1881	5·92	13·23	7·31
1882	5·44	12·64	7·20
1883	5·92	13·34	7·42
Means	6·26	13·14	6·88
1900 †	−0·48	+6·27	6·75
1901	−0·08	+6·10	6·18
1902	−0·10	+5·50	5·60
1903	−0·26	+6·20	6·46

Dr. Peney ‡ gives the mean range of the Nile here as 6 metres as the mean of ten years' observations between 1840 and 1860, but this would seem to be too low a value.

* See *post*. † A different gauge.

‡ *Bull. Soc. Geog.*, p. 33. Paris: July, 1863.

Until recently the available determinations of the volume of the upper Nile in flood have not been numerous, and the measurements which had been made did not agree well among themselves; besides this, the proportion furnished in flood by the White and Blue Nile respectively was quite uncertain. Linant considered them at the end of July to be practically equal; Peel made the Blue Nile to be double the volume of the White Nile at the end of October; but all observers agreed in describing the Blue Nile flood as sweeping across the White Nile, and forcing its stream of whitish water against the left bank, while the Blue Nile flood of muddy reddish water occupied the greater part of the channel.

The discharges measured by older travellers, together with those recently obtained, comprise the data that exist at present for comparing the volumes of the two main streams and their different tributaries.

Discharge of the Nile at Khartum.—The first who measured the discharge of the Nile at Khartum was Linant de Bellefonds,* who measured the White Nile on March 4, and the Blue Nile on March 5, 1822, giving as the combined discharge about 456 cubic metres per second.

	White Nile, March 4.	Blue Nile, March 5.
Area of section	582·8 square metres	360·3 square metres
Mean surface velocity ...	0·51 metre per second	0·44 metre per second
Discharge	297·2 cubic metres per second	158·5 cubic metres per second

In July, 1827, not in September as stated by Sir W. Willocks in 'The Nile in 1904,' p. 42, he again measured the discharge, with the following results†:—

	White Nile, July 26.	Blue Nile, July 30.
Area of section	3924·5 square metres	3288·1 square metres
Mean surface velocity ...	1·54 metre per second	1·9 metre per second
Discharge	6043·7 cubic metres per second	6247·3 cubic metres per second

The combined Nile near Alifun‡ at the end of July, 1827, gave—

Area of section	6982·2 square metres
Surface velocity	1·72 metre per second
Discharge	12,000 cubic metres per second

but of course none of these July discharges represented the full flood.

* *Bull. Soc. Geog.*, p. 436. Paris: 1852.

† *Bull. Soc. Geog.*, p. 436. Paris: 1852.

‡ Evidently a place below the junction is meant, but to-day a place of similar name exists a short distance up the Blue Nile.

The discharge of the combined stream below the junction does not appear to have been separately measured in March.

Petherick * gives the result of measurements of the White and Blue Niles at Khartum on July 5, 1848, when he states the Nile was nearly at its highest; but this cannot be the case, since the maximum of the Khartum gauge occurs in September—

Width.	Greatest depth.	Velocity.
White Nile, 500 yards	22 feet	2½ miles per hour
Blue Nile, 750 yards	20 feet	Nearly 2 miles per hour

These measurements correspond to sectional areas of about 2700 square metres and 4000 square metres respectively, and if the velocities are accepted, the discharges will be 3000 cubic metres per second for the White Nile, and 3700 cubic metres for the Blue Nile.

In October, 1851, a set of discharges was taken by Captain W. Peel †—

	White Nile.	Blue Nile.	Combined Nile.
Width	480 yards	768 yards ‡	1107 yards ‡
Average depth ...	13·92 feet	16·11 feet	14·38 feet
Average velocity ...	1·17 knot per hour	1·564 knot per hour	2·0 knots per hour
Number of observations for velocity	10	7	7
Discharge	2,985,400 cubic feet per minute	5,820,600 cubic feet per minute	9,526,700 cubic feet per minute
Date	October 25, 1851	October 24, 1851	October 23, 1851

The above results of Captain Peel, expressed in the metric system, are—

	White Nile.	Blue Nile.	Combined Nile.
Average depth, metres	4·24	4·93	4·38
Average velocity, metres per second	0·757	0·806	1·03
Discharge, cubic metres per second	1410	2749	4500

In March, 1876, L. A. Lucas measured the velocity of the Blue Nile at Khartum, but as he gives no measured section, the discharge cannot be satisfactorily deduced from his observations. In a letter to Dr. Schweinfurth, who has kindly communicated it, Lucas states that the discharge was about 780 cubic metres per second; but this is too high a value for March, and may be rejected.

In 1876, other measurements at Khartum gave the following results in cubic metres per second §:—

* 'Egypt and the Sudan,' p. 330. Edinburgh: 1861.

† 'A Ride across the Nubian Desert,' by Captain W. Peel. London: 1852.

‡ Taken as 760 yards and 1090 yards for calculation by Captain Peel.

§ 'Chélu. Le Nil, le Soudan, l'Egypte,' p. 38. Paris: 1891.

	White Nile.	Blue Nile.
March	369	198, low stage
June...	1050*	—
September	4351*	4398,† flood
December	2720	—

In April, 1883, both of the branches of the Nile at Khartum were measured by J. M. Schuver.‡

White Nile.—Taken on April 21, 1883, 200 metres above the junction with the Blue Nile, where the river was narrowed by an island. Above this point the river was 600–800 metres wide.

	Metres.	Metres.	Metres.	Metres.	Metres.	Metres.	Metres.
Distance from east bank ...	30·0	55·0	80·0	94·0	108·0	133·0	158·0
Depth	0·5	2·5	4·0	5·5	8·5	4·0	1·0

Area of section = 524 square metres, while the velocity was 100 metres in 1 minute 10 seconds = 1·43 metre per second. Discharge = 750 cubic metres per second.

Blue Nile.—Taken on April 21, 1883. Of the total breadth of 320 metres, 140 metres was water and 180 metres sandbank.

	Metres.	Metres.	Metres.	Metres.	Metres.
Distance from north bank	20·0	50·0	70·0	90·0	120·0
Depth	4·0	11·0	6·0	3·5	1·0

Area of section = 607·5 square metres, and the velocity = 100 metres in 4 minutes 30 seconds, or 0·27 metre per second. Discharge = 225 cubic metres per second.

Collecting the various results, we obtain the following table :—

TABLE V.

Date.	White Nile, cubic metres per second.	Blue Nile, cubic metres per second.	Combined Nile, cubic metres per second.
March 4–5, 1822 ...	297	158	—
July 26–30, 1827 ..	6044	6247	12,000
July 5, 1848	3000	3700	—
October 23–25, 1851 ...	1410	2749	4500
March, 1876	369	—	—
Low stage, 1876 ...	—	198	—
June ,, ...	1050	—	—
Flood ,, ...	—	4398	—
September ,, ...	4351	—	—
December ,, ...	2720	—	—
April, 1883	750	225	—

* This value is too high.

† Much too low, as in 1876 the Nile was above the average in September.

‡ *Pet. Mitt.*, 1883, p. 268.

From May, 1902, until January, 1904, a series of discharges of the Blue Nile were carefully taken by Messrs. Barron, Beadnell, and Hume, of the Egyptian Survey Department, about 5 kilometres above Khartum, of the White Nile at Dueim, 320 kilometres above Khartum; and by the late Captain C. H. Wood, of the Atbara, 35 kilometres from its mouth. These discharges were all taken with a Price's current meter, used from a boat, which was passed across the river by means of a hawser, so that intervals could be measured and soundings taken as often as required. The width was verified by means of a theodolite, and any stretching of the rope allowed for. The following tables, VI., VII., and VIII., give the results for the White Nile at Dueim, and the Blue Nile at Buri, just up-stream of Khartum, and for the Atbara at Abadar.

TABLE VI.

WHITE NILE, DUEIM.

Date.	Mean velocity in metres per second.			Discharge in cubic metres per second.				Gauge in metres.
	E	I	W	E	I	W	Total.	
1902.								
May 13	0·198	—	0·255	87	—	260	347	0·51
June 11	0·314	—	0·426	205	—	445	650	1·00
July 8	0·314	—	0·396	277	—	511	788	1·44
August 5 ..	0·311	—	0·284	385	—	482	867	2·20
September 2 ...	0·061	—	0·165	37	—	293	330	3·48
October 1 ...	0·196	—	0·276	360	—	510	870	3·50
,, 28 ...	0·268	—	0·266	365	—	437	802	2·50
December 1 ...	0·306		0·337	392	—	538	930	2·05 (?)
,, 29 ...	0·506	—	0·567	623	—	895	1518	2·02
1903.								
January 27 ...	0·257	—	0·347	213	—	450	663	1·12
February 24 ...	0·187	—	0·300	127	—	335	462	0·46
March 24 ...	0·277	—	0·452	137	—	422	559	0·86
April 21	0·243	—	0·416	109	—	306	415	0·36
May 19	0·297	—	0·373	122	—	325	447	0·38
June 16	0·277	—	0·379	208	—	450	658	1·09
July 1	0·335	—	0·416	311	—	573	884	1·31
,, 14	0·298	—	0·318	313	—	522	835	1·71
August 4 ...	0·217	—	0·264	304	10	454	768	2·46
,, 11 ...	0·125	0·087	0·131	228	31	320	579	3·28
,, 18 ...	0·136	0·143	0·097	254	62	218	534	3·68
,, 23 ...	0·127	0·084	0·130	270	46	338	654	4·08
,, 28 ...	0·125	0·113	0·142	269	62	379	710	4·19
September 2 ...	0·155	0·126	0·094	332	75	164	571	4·32
,, 7 ...	0·158	0·108	0·119	357	62	318	737	4·44
,, 12 ...	0·150	0·084	0·110	309	51	293	653	4·46
,, 18 ...	0·183	0·090	0·142	397	53	390	840	4·23
,, 24 ...	0·147	0·114	0·148	320	65	378	763	4·31
October 7 ...	0·308	0·225	0·255	700	110	778	1588	3·93
November 3 ...	0·400	0·163	0·404	680	35	848	1563	3·11
,, 24 ...	0·450	—	0·457	773	—	892	1665	2·44
December 8 ...	0·419	—	0·427	629	—	833	1462	2·06
,, 22 ...	0·411	—	0·415	620	—	783	1403	1·80

E = east channel; I = island, submerged in flood; W = west channel.

TABLE VII.

Blue Nile.

Discharges taken 5 kilometres above Khartum.

Date.	Mean velocity in metres per second.	Discharge in cubic metres per second.	Gauge in metres.	Date.	Mean velocity in metres per second.	Discharge in cubic metres per second.	Gauge in metres.
1902.				1903.			
May 9	0·120	184	−0·05	March 6 ...	0·162	202	0·19
,, 23	0·124	194	+0·16	,, 20 ...	0·182	201	0·04
June 6	0·314	604	0·76	April 3 ...	0·124	132	−0·12
,, 20	0·372	695	1·06	,, 17 ...	0·132	154	−0·16
,, 27	0·393	837	1·30	May 1	0·106	121	−0·22
July 4	0·507	1082	1·75	,, 8	nil.	not	−0·23
,, 11	0·616	1453	2·07	,, 15	nil.	measure-	−0·26
,, 18	0·668	1612	2·33	,, 22	nil.	able	−0·09
,, 25	0·702	1885	2·64	,, 28	0·235	374	+0·53
August 1 ...	1·098	3420	3·34	June 6	0·505	970	1·40
,, 8 ...	1·344	4880	4·20	,, 19	0·680	1500	1·90
,, 15 ...	1·322	4720	4·50	,, 26	0·524	1089	1·58
,, 22 ...	1·545	5540	4·93	July 3	0·628	1314	1·78
,, 29 ...	1·745	7180	5·34	,, 10	0·803	1952	2·48
September 5 ...	1·502	6580	5·27	,, 17	0·882	2267	2·75
,, 12 ...	1·620	5800	5·35	,, 24	1·177	3183	3·40
,, 19 ...	1·590	5760	5·30	,, 31	1·084	2870	3·45
,, 26 ...	1·428	4860	5·10	August 5 ...	2·103	7584	4·60
October 3 ...	1·470	4880	5·03	,, 10 ...	1·715	7100	5·06
,, 10 ...	1·096	3250	4·45	,, 14 ...	2·456	9340	5·65
,, 17 ...	0·931	2460	3·73	,, 21 ...	2·796	9519	5·90
,, 24 ...	0·833	2030	3·40	,, 28 ...	2·566	9544	6·05
,, 31 ...	0·535	1244	3·00	September 4 ...	2·094	8474	6·20
November 7 ...	0·580	1272	2·77	,, 11 ...	1·960	8385	6·15
,, 14 ...	0·461	1035	2·48	,, 18 ...	1·814	7070	5·88
,, 21 ...	0·463	802	2·23	,, 25 ...	1·879	8965	6·08
,, 28 ...	0·394	787	2·11	October 2 ...	1·518	6581	5·53
December 5 ...	0·323	654	1·94	,, 9 ...	1·493	5749	5·15
,, 12 ...	0·288	486	1·80	,, 16 ...	1·105	3812	4·45
,, 23 ...	0·281	476	1·58	,, 23 ...	1·210	4198	4·56
1903.				,, 30 ...	0·945	2893	4·00
January 2 ...	0·216	348	1·39	November 6 ...	0·800	2275	3·50
,, 9 ...	0·182	270	1·22	,, 13 ...	0·679	1790	3·10
,, 16 ...	0·166	248	1·09	,, 20 ...	0·579	1456	2·65
,, 23 ...	0·178	250	0·94	December 4 ...	0·472	1102	2·35
February 6 ...	0·168	225	0·60	,, 18 ...	0·356	789	1·90
,, 20 ...	1·114	152	0·39	,, 25 ...	0·318	722	1·88

TABLE VIII.

Atbara River.

Discharges taken in 1903 *at Abadar, 30 kilometres from Nile.*

Date.	Mean velocity in metres per second.	Discharge in cubic metres per second.	Gauge in metres.	Date.	Mean velocity in metres per second.	Discharge in cubic metres per second.	Gauge in metres.
July 16	0·838	381	2·00	September 5 ...	1·435	2822	5·53
,, 23	0·964	538	2·43	,, 12 ...	1·336	2091	4·95
,, 27	1·008	780	3·02	,, 18 ...	1·161	1672	4·57
August 2 ...	0·939	758	3·07	,, 25 ...	1·032	1267	3·83
,, 5 ...	1·203	1448	4·24	,, 28 ...	0·876	902	3·28
,, 14 ...	1·491	2318	5·15	October 2 ...	0·914	925	3·24
,, 15 ...	1·621	2931	5·67	,, 4 ...	0·838	754	3·01
,, 27 ...	1·679	2632	5·09	,, 5 ...	0·835	703	2·82
,, 30 ...	1·609	3088	5·61				

Volume discharged July 16 to October 5, 11,972·4 millions of cubic metres.

In these discharges the holding up of the White Nile water by that of the Blue Nile, when the latter is in flood, is very markedly shown, and the slackening of the current at this time of the year is a fact well known to the boatmen of the White Nile. It is this which leads to the extensive flooding which takes place above Khartum, filling the khors and low-lying land along the river with water, which drains off when the Blue Nile flood has fallen sufficiently; this is usually in October. To further prove this, a series of measurements were made in the White Nile close to Khartum, just above the junction with the Blue Nile, in order to see if there was a very feeble velocity there, and the data obtained are inserted here, as it is important to demonstrate that the flood is practically independent of the White Nile, and therefore the meteorological conditions and the rainfall in that basin are negligible in a discussion of the Nile flood. Seven sets were taken during August and September, 1903, and the results are of considerable interest.*

On August 7, 1903, the measurements were made 1 kilometre above the ferry between Omdurman and Khartum; one point was in the eastern half of the channel, the other in the western half.

East channel.		West channel.	
Depth from surface.	Velocity.	Depth from surface.	Velocity.
metres.	metres per second.	metres.	metres per second.
0	0	0	0
1	0	1	0
2	0	2	0
3	0	3	0
4	0	4	0

On August 23, 1903, measurements were made at three points—the first, A, was in the centre of the White Nile channel close to the incoming water of the Blue Nile; the second was in the main channel 1 kilometre up-stream; the third point was opposite the village of Ramela, 5 kilometres from the junction of the two Niles. At a short distance down-stream of A, the turbid waters of the Blue Nile could be seen carrying down with them masses of the clear White Nile water.

August 23—

Depth from surface.	A.	B.	C.
metres.	metres per second.	metres per second.	metres per second.
0	0·276	0·243	0·264
1	0·172	0·150	0·198
2	0·195	0·083	0·099
3	0·218	0·034	0·075
4	0·230	0·048	0·039
5	0·195	0·018	0·023
6	0·264	—	0·057
7	0·184	—	0·078
8	—	—	0·034
Mean	0·217	0·096	0·096

* The following details are taken from the original observations, by the kind permission of Sir W. Garstin, G.C.M.G.

After these preliminary experiments, the measurements were made on August 28, September 4, September 11, September 18, and September 24, off Ramela, at different distances from the right bank—

August 28—

Depth from surface.	From right bank. I. 700 metres.	II. 1200 metres.	III. 1400 metres.	IV. 1600 metres.
metres.	metres per second.	metres per second.	metres per second.	metres per second.
0	0·000	0·076	0·034	0·000
1	0·023	0·044	0·000	0·000
2	0·000	0·028	0·014	0·000
3	—	0·009	0·000	0·000
4	—	0·000	0·023	—
5	—	0·000	0·053	—
6	—	0·000	—	—
7	—	0·000	—	—
8	—	0·000	—	—
Mean	0·008	0·017	0·021	0·000

September 4—

Depth from surface.	From right bank. I. 700 metres.	II. 900 metres.	III. 1200 metres.	IV.
metres.	metres per second.	metres per second.	metres per second.	
0	0·391	0·299	0·345	
1	0·278	0·200	0·255	
2	0·306	0·242	0·283	
3	0·278	0·333	0·230	Too rough to continue; southerly gale.
4	0·290	0·200	0·188	
5	0·368	0·257	0·181	
6	—	0·271	0·191	
7	—	0·306	0·195	
8	—	—	0·131	
Mean	0·318	0·264	0·222	

The effect of the wind in forcing down the White Nile water is here very marked.

September 11—

Depth from surface.	From right bank. I. 800 metres.	II. 1100 metres.	III. 1600 metres.	IV. 2100 metres.
metres.	metres per second.	metres per second.	metres per second.	metres per second.
0	0·241	0·276	0·267	0·278
1	0·051	0·126	0·165	0·167
2	0·021	0·125	0·125	0·161
3	0·000	0·071	0·103	0·126
4	0·000	0·067	0·078	0·136
5	—	0·043	0·078	—
6	—	0·000	0·078	—
7	—	0·012	0·062	—
8	—	0·014	—	—
Mean	0·063	0·082	0·120	0·174

September 18—

Depth from surface.	From right bank.				
	I. 700 metres.	II. 950 metres.	III. 1250 metres.	IV. 1650 metres.	V. 1950 metres.
metres.	metres per sec.	metres per sec.	metres per sec.	metres per sec.	metres per sec.
0	0·276	0·315	0·292	0·260	0·202
1	0·115	0·108	0·124	0·120	0·085
2	0·039	0·044	0·087	0·085	0·037
3	—	0·030	0·067	0·071	0·000
4	—	0·016	0·057	0·057	—
5	—	0·000	0·051	0·032	—
6	—	—	0·028	0·009	—
7	—	—	0·025	—	—
8	—	—	0·000	—	—
Mean ...	0·143	0·086	0·081	0·091	0·081

September 25—

Depth from surface.	From right bank.				
	I. 600 metres.	II. 900 metres.	III. 1200 metres.	IV. 1750 metres.	V. 2250 metres.
metres.	metres per sec.	metres per sec.	metres per sec.	metres per sec.	metres per sec.
0	0·237	0·276	0·287	0·276	0·303
1	0·131	0·140	0·140	0·113	0·162
2	0·043	0·048	0·039	0·067	0·046
3	0·000	0·016	0·037	0·018	0·018
4	—	0·032	0·000	0·034	—
5	—	0·016	0·000	0·007	—
6	—	—	0·000	—	—
7	—	—	0·000	—	—
8	—	—	0·000	—	—
Mean ...	0·103	0·088	0·056	0·086	0·132

The mean velocities in the White Nile at Dueim and in the Blue Nile above Khartum about the same dates were—

Date.	White Nile at Dueim.	Date.	Blue Nile above Khartum.	
	metres per second.*		metres per second.	
August 4	0·240	August 5	2·103	
,, 23	0·114	,, 21	2·796	
,, 28	0·127	,, 28	2·566	Maximum discharge of Blue Nile.
September 2	0·125	September 4	2·094	
,, 12	0·115	,, 11	1·960	
,, 18	0·138	,, 18	1·814	
,, 24	0·136	,, 25	1·879	

From these results the effect of the Blue Nile flood is plainly seen; the complete absence of current on August 4 was, doubtless, the result of the sudden arrival of the main flood of the Blue Nile about August 2 and 3, when the discharge rose from 2870 cubic metres per second on July 31 to 7584 cubic metres per second on August 5.

* The mean of the mean velocities in the two channels and over the flooded island.

It is now easy to see how Linant obtained his discharge of 6044 cubic metres per second for the White Nile in flood. He took his measurements on July 26, 1827, and therefore before the Blue Nile had reached its maximum; the surface velocity he obtained of 1·54 metre per second must have been taken very near the junction with the Blue Nile to have so high a value, since at Dueim 0·567 metre per second is the highest mean velocity recorded in 1902 and 1903; the velocity thus obtained applied to the whole or a greater part of the White Nile section will account for the high discharge obtained.

Throughout July and August, 1903, at Dueim on each occasion that a discharge was taken, the velocity was also measured at each successive metre from the surface at the deepest part of the section.

The water was found to be moving at all parts of the section until September 2, when there was a distinct reduction of the velocity near the bottom at several of the points at which the velocity was measured; this layer varied apparently from 1 to 2 metres in the thickness. The same occurred on September 7, but to a less extent. On September 12 there was a layer of water a metre deep at the bottom which was not appreciably moving. This was found to be the case at five points—at 130, 175, and 265 metres from the east bank, and at 148 and 193 metres from the west bank. After this date the water was moving throughout the section.

The earlier observations agree fairly well with those obtained in 1902 and 1903 at Khartum and Dueim for the Blue Nile and for the White Nile at low stage, but the flood discharges of the White Nile show a very large discrepancy—

1902.	Cubic metres per second.	1903.	Cubic metres per second.	Previous measurements.	Cubic metres per second.
July 8	827	July 14	835	July 5, 1848	3000
August 5	910	August 4	768	July 30, 1827	6044
Sept. 2	350	Sept. 2	571	Sept., 1876	4351

Thus it is evident that the surface velocities taken by former observers give a wholly false result, since the greater part of the White Nile is being held up by the flood of the Blue Nile, and only a surface stratum of water near the junction was passing down with a velocity nearly the same as that of the Blue Nile water. It may even be that at times some water flows from the Blue Nile *up* the White Nile channel, but only for a very short time, and not throughout July and August,* as has been stated. Seeing, too, that the Sobat flood-

* Willcocks, 'The Nile in 1904,' p. 57. Cairo: 1905. See also Lyons, 'The Rains of the Nile Basin in 1904.' Cairo: 1905.

supply must be estimated at less than 1500 cubic metres per second, and that of the Bahr-el-Zaraf, Bahr-el-Jebel, and Bahr-el-Ghazal combined at less than 600 cubic metres per second,* the maximum discharge can rarely reach 2000 cubic metres per second under the present conditions, when the amount of flooding in the Taufikia-Khartum reach, and the amount of water which the marshes lining its banks must absorb, is taken into account; also the discharges for 1902 and 1903 show that the maximum discharge of the White Nile takes place in December when the floods are subsiding, after the Blue Nile has fallen.

Taking now the discharges of the Blue Nile in Khartum, which were measured in 1902 and 1903, we can obtain an approximate value for the volume of water which passed down the Blue Nile in the floods of those years. From the measured discharges taken every seven days, the daily discharge in cubic metres per second has been estimated, and from these five-day means have been obtained, which are given in the following table:—

TABLE IX.

1902 Flood.	Mean discharge in cubic metres per second.	Volume discharged during period in millions of cubic metres.
July 1- 5	1100	475·2
,, 6-10	1330	574·5
,, 11-15	1480	639·3
,, 16-20	1600	691·2
,, 21-25	1800	777·6
,, 26-31	2700	1399·6
August 1- 5	4030	1741·0
,, 6-10	4720	2039·0
,, 11-15	4900	2116·8
,, 16-20	5200	2246·4
,, 21-25	6000	2592·0
,, 26-31	6900	3577·0
September 1- 5	6950	3002·4
,, 6-10	6450	2786·4
,, 11-15	6100	2635·2
,, 16-20	5900	2548·8
,, 21-25	5450	2354·4
,, 26-30	5020	2602·4
October 1- 5	4830	2086·6
,, 6-10	4040	1745·3
,, 11-15	3100	1339·2
,, 16-20	2650	1144·8
,, 21-25	2170	937·4
,, 26-31	1650	855·4
	Total	42,907·9

For the same period in 1903 we obtain in the same way the following table:—

* Garstin, 'A Report upon the Basin of the Upper Nile,' p. 161. Cairo: 1904.

TABLE X.

1903 Flood.	Mean discharge in cubic metres per second.	Volume discharged during period in millions of cubic metres.
July 1- 5	1290	556·8
,, 6-10	1790	771·6
,, 11-15	2190	944·8
,, 16-20	2600	1123·2
,, 21-25	2950	1274·4
,, 26-31	2950	1529·3
August 1- 5	5220	2225·0
,, 6-10	7250	3132·0
,, 11-15	8250	3564·0
,, 16-20	9420	4069·4
,, 21-25	9500	4138·6
,, 26-31	9500	4950·7
September 1- 5	8850	3823·2
,, 6-10	8400	3628·8
,, 11-15	7950	3434·4
,, 16-20	7450	3218·4
,, 21-25	8250	3564·0
,, 26-30	8100	4199·0
October 1- 5	6700	2894·4
,, 6-10	5800	2505·6
,, 11-15	4850	2095·2
,, 16-20	4150	1792·8
,, 21-25	3850	1663·2
,, 26-31	3150	1632·9
	Total	62,761·8

Thus the volume of the Blue Nile flood of 1902 was to that of 1903 approximately as 42,908 to 62,762, or as 0·68 to 1·00.

They may be compared with previous years by means of the Wadi Halfa gauge records, by taking the mean of the readings for each day for the twelve years 1891–1902, and noting the difference between these mean values and the readings of 1902 and 1903. To shorten the table, the mean difference for each month only is given—

TABLE XI.

Month.	Mean difference in centimetres from mean readings of 1891–1902.	
	1902.	1903.
	centimetres.	centimetres.
July	- 79	-18
August	-200	-69
September ...	- 92	+ 6
October	- 57	+27
Mean	-107	- 9

so that 1903 may be considered as rather below an average flood, while that of 1902 was an extremely bad one.

It should be noticed that the volume brought down by the Atbara is included in the Wadi Halfa gauge-readings, but is not included in

the Khartum measurements. Probably no great error is introduced, but the volume discharged in 1902 and 1903 by the Atbara cannot be compared, as the 1902 discharges were taken too near the junction. In 1903 the volume discharged between July 16 and October 5 was 11,972·4 millions of cubic metres.

Having thus obtained the relation of a bad flood to a normal flood, it is desirable to get that of a normal flood to a maximum flood, which can be deduced from the Aswan gauge records.

In Table XIII. is given the total volume discharged at Aswan from July 1 to October 31 in the years 1869 to 1900, calculated from the discharge table given by Sir W. Willcocks.* From this the proportion of the volume of the low flood of 1902 to the average flood of thirty-five years is 0·63 to 1·00, a relation not very different from that obtained for the Blue Nile at Khartum; and taking 1878 as a maximum year, we have—

Minimum year. Volume.			Average year. Volume.			Maximum year. Volume.
0·63	...	...	1·00	...	...	1·24

or, speaking in general terms, the volumes of the maximum and minimum floods are respectively about 30 per cent. above and below the volume of a mean flood.

Having detailed the principal features of a normal Nile flood, the variation in its date from year to year, the amount of water discharged in a low flood and a normal flood, it now remains to enumerate the various tributaries which supply the Blue Nile and the Atbara. The information about most of these is extremely meagre, but it is of importance to put together all that exists in order to trace the supply of their flood waters as rains commence in their catchment basins, and the fall of their waters as the rains decrease, for this fall will first affect the rivers draining the northern parts of Abyssinia. As the climate of Abyssinia becomes better known and more observations are available, it will, no doubt, be possible to follow the successive rises and falls of the different tributaries and trace their several effects on the main stream.

The tributaries of the Abai and Blue Nile are very numerous, and only the more important ones need be mentioned here. On the left bank are the following: the Bashilo, which rises near Magdala and drains a large part of the eastern plateau to the south of the basin of the Takazze; the next important stream is the Jamma, which rises near Ankober, and drains a large part of Shoa; from where it joins the Abai, the united streams turn south-west, having at this point a width of 60 to 70 metres and a depth of 3 or 4 metres, according to Rochet;† the Muger rises to the north of Adis Abeba and joins the Abai a little south

* 'Perennial Irrigation,' App. III. Table I. Cairo: 1894.

† Von Klöden, 'Stromsystem des oberen Nil,' p. 202. Berlin: 1856.

of 10° N. lat.; the Guder rises on the north side of the Rogge mountains, which divide its basin from that of the Omo and the Hawash. After these comes the Didessa, which is the most important tributary of the Blue Nile. Rising somewhat south of 8° N. lat., and near the headwaters of the Baro, it flows northwards to the Abai, which it meets just south of 10° N. lat., and in about 35° 40′ E. long.*

Michel † crossed it at two points high up, one 50 kilometres below the ford opposite Mount Deka, to the west of Bilo, and the other at the ford. On June 12, 1897, it was 110 metres wide, of which 40 metres was the main channel, having a depth of 3·35 metres, while the depth outside the channel was 1 metre. The velocity was 1·30 metre per second, so that the discharge was about 110 cubic metres per second. It had commenced to rise on May 25, and fell from October 10; the water was turbid and red in colour.

At the second place a more detailed section was taken on September 13, 1897.

	Metres.	Metres.	Metres.	Metres.	Metres.
Distance from left bank ...	5	25	60	95	105
Depth	2·80	3·55	4·20	4·0	3·05

This gives a sectional area of 392 square metres, and this with a velocity of 1·80 metre per second corresponds to a discharge of about 700 cubic metres per second. At this season its valley was flooded to a depth of 60 centimetres. At the beginning of April, 1898, the Didessa at this same place was only 45 metres wide and 0·45 metre deep.

These measurements were all taken before the Anjur joins it, so that they must be below the total amount which it carries to the Abai. In its early rise, long flood period, and late fall, the Didessa is, in its regimen, very like the Sobat, near the headwaters of which it rises.

As this part of the course of the Blue Nile has been little visited, I give a description of it from the Didessa junction to Famaka, for which I am indebted to Mr. A. Hay, who was recently for some time in this part of the country.

"Just about 2 miles above its junction with the Didessa river, the Blue Nile emerges from a high gorge in a range of mountains. At the end of the hills there is a shallow, rocky, gravel-bottomed rapid, and here the river, hitherto running almost due north, makes a sharp bend to due west. At the end of this stretch, which is about a mile long, the Didessa joins and appears to come in on a course similar to

* Weld Blundell, *Geog. Jour.*, March, 1900. Hughes Le Roux, 'Menelik et nous.' Paris: 1901.

† 'Vers Fachoda,' p. 557. Paris: 1900.

that which the Blue Nile now assumes after another sharp bend to north-west. The Didessa is very rocky, and full of rapids just above the confluence. The Blue Nile now travels about 10° west of north to due west. At the top of this stretch there is a regular cataract. This course is maintained generally down to the confluence of the Durra river, which comes from a course slightly north of east, and at the end of March the Durra carries about 3 cubic metres per second.*

"From the confluence of the Didessa with the Blue Nile down to the Durra river, I reckon it is approximately 23 miles. There are frequent rapids on this stretch of river, and one particularly deep gorge just above a very large sandy khor.

"From the Durra river to the Gojabba river, which in dry weather is a succession of pools, is approximately 15 miles. Due west of Gojabba river, and about 2 miles from the left bank of the Blue Nile, stands Mount Gumbi, and 5 miles further is the village of Yimbi. In this stretch of river there are not so many rapids, although a few of them are very long ones, and the bed of the river is made up of gravel-banks, deposited on rocks.

"Wamboro plateau lies in 10° 2′ N. lat., and about 8 miles north-east of the Blue Nile.

"From Gojabba river to Abu Timbohor is approximately 30 miles, and the general direction of the river is 20° west of north. About a mile below Gojabba is a heavy cataract, and after this, with the exception of one rapid, it enters a rocky gorge, but is deep and flows quietly along. When it reaches the head of Abu Timbohor's villages, it makes a sharp bend to due west for about 3 kilometres, and then resumes a course of 12° west of north, enclosing an island of 300 acres.

"Opposite Abu Timbohor's head village is a large mountain (name unknown), about 3 kilometres north-west of the confluence of the Dabus river with the Blue Nile. About 24 kilometres east lie the Gum Gum mountains.

"From Abu Timbohor to Yaring is a distance of approximately 50 kilometres, and the course of the river is 12° west of north. There are fewer rapids, and the river is rather gorgy all the way.

"The Bellus (Bolassa) river joins the Blue Nile about 11 kilometres above Yaring, which is about 3 kilometres further up the river than Bambok's village."

The river called Bolassa, or Yesien,† was also visited by Schuver in May, 1882, when he marched along the last 40 kilometres of it until it joined the Blue Nile. He describes this last permanent tributary of the Blue Nile as a fine winding stream of clear water which then (May 20) was at its lowest, and without a perceptible current. It lay between high banks of grey granite. On May 22, 1882, the river began to rise

* The letter says "per minute," but this would make the flow almost imperceptible.

† Schuver, *Pet. Mitt.*, Erganz. 72, p. 79. Gotha: 1883.

and the water to become muddy, while the Blue Nile water had become so earlier.

The next tributary after the Didessa on the left bank is the Dabus, or Yabus, which rises in the Beni Shangul hills, and, flowing northwards, joins the Abai where it leaves the Abyssinian mountains and turns northwards towards Famaka. Weld Blundell * describes it as a fine river flowing in a deep valley between hills 650 metres high; it was about 200 metres wide and 1 metre deep when he crossed it at 10° 13′ N. lat. at the beginning of May, 1899.

The Tumat joins the Blue Nile 6 kilometres down-stream of Famaka. It has been described incorrectly as carrying water throughout the year,† but Schuver describes seeing the first water of the flood come down its bed near Jebel Ghezan, on the road from Famaka to Beni Shangul, in 10° 45′ N. lat., at the end of May, 1881.‡ Marno § states that in the dry season water may everywhere be found in the river-bed at a short distance from the surface. All these larger tributaries must bring down a large volume in the rainy season, and most of them contribute a certain amount throughout the low stage of the Blue Nile also, so that the supply in the months of the spring and the early summer depends on them and the Abai itself. The Abai was found by Dupuis ‖ on January 31, 1903, to be discharging only 42 cubic metres per second where it left Lake Tsana, thus the winter and spring supply of the Blue Nile comes mainly from its tributaries. In marked distinction to the left-bank tributaries are those of the right bank; with a steep slope and a short course, they are torrential in character, and rise and fall rapidly, but, after the rainy season, soon fall to very small dimensions. The Rahad and Dinder which rise in the western foothills of Abyssinia, and flow north-west to join the Blue Nile above and below Wad Medani respectively, are larger streams, and are of importance when in flood.

Pruyssenaere ¶ measured the discharge of both of these, as well as of the Blue Nile at Karkoj in 1864, at highest flood, and gives the following values:—

	Width.	Mean depth.	Sectional area.	Mean velocity.	Discharge.
	metres.	metres.	square metres.	metres per second.	cub. metres per second.
Blue Nile (Karkoj)	435·0	7·10	3088	1·90	5867
Dinder (Wold Abyaĕ), 13° 3′ N.	163·4	4·58	746	1·90	1454
Rahad (Wold Es), 13° 19′ 5″ N. ...	83·2	3·14	261	2·05	535

* *Geog. Jour.*, Feb., 1900.

† *Bull. Soc. Geog.*, 1843, **19**, p. 99.

‡ "Reisen in oberen Nilgebiet," *Pet. Mitt.*, Erganz. **72**, p. 1. Gotha: 1883.

§ *Pet. Mitt.*, 1873, p. 250.

‖ 'Report upon Lake Tsana,' p. 19 (published with Sir W. Garstin's report on the Basin of the Upper Nile). Cairo: 1904.

¶ *Pet. Mitt.*, Erganz. **51**, 1877, p. 45.

In 1864 the Dinder was flowing with a feeble current on February 18, and soon afterwards ceased to flow.* They both rise about the end of May or the beginning of June. There are no gauges on either of these rivers, so no more recent data are available.

The right-bank tributaries therefore contribute very little to the low-stage supply; they have for the most part, not only smaller catchment basins, but a shorter rainy season. The left-bank tributaries draining Shoa, Wallega, and northern Kaffa have larger basins and longer rains, so that if the September and October rains are above the average, these streams will supply a larger volume to the Nile at low stage, as also will the Sobat, and, as has already been mentioned, these are the determining factors of the low-stage supply.

Before leaving the Blue Nile, the rate of transmission of the flood wave should be considered. Data for this purpose are not very ample, but they will suffice to form an estimate of the time which elapses between the rainfall entering the tributaries and reaching Khartum. On Fig. II. are plotted the flood curves of the Blue Nile from the gauge readings at Roseires, Sennar, Wad Medani, Khartum, Berber, Wadi Halfa, and Aswan for the flood of 1903, and from them the following data are taken †:—

River at Roseires.	Date.	Days taken for water to travel.		
		Roseires to Sennar, 273 km.	Sennar to Wad Medani, 146 km.	Wad Medani to Khartum, 230 km.
Fell	May 31	3	1	3
Rose	June 4	2	2	3
Fell	,, 12	3	1	2
Rose	,, 25	2	2	2
Fell	July 8	3	2	3
Rose	,, 12	3	1	2
Fell	,, 17	3	0†	2
Rose	,, 27	1	2	2

Mean time Roseires to Sennar 2·5 days, or 109 km. per day.
,, ,, Wad Medani 4 ,, 105 ,,
,, ,, Khartum 6·4 ,, 100 ,,

or about 10 to 11 days from the centre of its basin.

The last tributary of the Nile is the Atbara, which has been considered by some writers as of almost equal importance with the Blue Nile, while by others it has been thought to be almost insignificant in its effect. If the early rains are unusually heavy, the Atbara will bring down a very large flood; but in years when the late rains are

* The Dinder is not a perennial stream, as stated in *Scot. Geog. Mag.*, 1904, p. 480, except near its source.

† As the gauges are only read once a day, it is not always possible to determine with accuracy the time taken by the flood wave.

the heavier, the Atbara flood will not be so marked, since the rainbelt nas moved southwards: 1874 was an instance of the first, and 1878 of the second case. In 1903 the volume discharged by the Atbara from July 16 to October 5 was to that discharged by the Blue Nile for the same period as 11,972 to 50,799, or about 1 to 4·3. It rises about the middle of June, reaches its maximum about the third week in August, and then falls rapidly; from November to June much of its lower course is dry, except for isolated pools. On Fig. III. are plotted gauge curves, for Khashm el Girba 410 kilometres, and for Abadar 30 kilometres from the junction with the Nile for the flood of 1903; at Abadar there was a temporary gauge, which was read daily while discharges were being measured. The discharge, as may be seen from the discharge diagram, Fig. III., varied from about 400 cubic metres per second on July 16 to 3000 cubic metres per second on August 31. The rate of movement of the flood-wave can be deduced from a comparison of the two gauge curves until about August 20; after that the Blue Nile had risen nearly to its maximum, and seems to have disturbed the regular agreement of the two curves for a while.

The rate of transmission of the flood-wave is deduced from the following data :—

River at Kashm el Girba.	Date.	Days taken for water to travel from Khashm el Girba to Abadar, 380 kilometres.	
Rose	July 26	4	
Fell	Aug. 2	2	Mean time of travel for a rise, 3 days.
Rose	,, 8	3	Mean time of travel for a fall, 2½ days.
Fell	,, 11	2	
Rose	Sept. 15	2	
Fell	,, 17	0	
Rose	,, 26	3	
Fell	,, 27	3	

This gives a rate of 127 kilometres per day for a rise, and 152 kilometres per day for a fall. Possibly the difference is illusory, and is due to gauges being read only once daily. In this case the mean value of 138 kilometres per day is probably a safer one to use. If the point where the course of the Takazze turns from north to west be taken as the centre of its basin, then the water from this point has about 450 kilometres to travel to Khashm el Girba, and 410 kilometres more to the Nile. In doing so it falls from about 900 metres above sea-level at this point of the Takazze to about 460 metres at Khashm el Girba, and then to about 350 metres at the Nile. Thus, if it takes 2·75 days from Khashm el Girba to the Nile, we may add about 2·5 days for the rainfall of the middle of the upper catchment basin to reach Khasm el Girba, which will give 5 to 5·5 days for it to reach the Nile.

Having now an approximate estimate of the time taken from the Blue Nile rainfall to get to Khartum, viz. 11 days, and from the basin

of the Takazze to the Nile near Berber 5·5 days, these may be added to the times taken by the flood-wave from Khartum to Aswan as given by Sir Hanbury Brown * for July 2 and September 9—that is, the early part and top of the flood.

Beginning of	Blue Nile basin to Khartum.	Khartum to Aswan.	Total.
	days.	days.	
July	11	18	29
September	9	9	18

Beginning of	Takazze basin to Berber.	Berber to Aswan.	Total.
	days.	days.	
July	5½	14	19½
September	5½	7	12½

It is instructive to compare the gauge-curve of Khashm el Girba, representing the drainage of the northern part of Abyssinia, with that of Roseires, representing the drainage of the central and southern part. After June most of the larger rises and falls of the Roseires gauge can be matched by others about the same date on the Khashm el Girba gauge, those of July 30, August 3, August 10–18, August 27–31, September 17–23, 1903, being the most marked. This shows that the rainfall is widely distributed, and varies not locally so much as by a succession of heavier and lighter falls which affect the whole plateau similarly.

(To be continued.)

EXPLORATION IN ASIATIC TURKEY, 1896 TO 1903.†

By Colonel P. H. H. MASSY.

"Topography is the foundation of history." We read this in Prof. W. M. Ramsay's valuable treatise on the historical geography of Asia Minor published in 1890 under the authority of this Society. The deep meaning of these words is most fully realized in a still primitive country such as Asiatic Turkey, where, as we look upon the ever-varying features which lie before us, unsmothered by modern civilizing appliances, we feel it to be a land of which the topography, as well as the history, is still to-day but very imperfectly understood.

Topographical and historical research must progress hand-in-hand

* 'Report of the Public Works Department, Egypt, for 1902,' p. 184. Cairo: 1903.

† Read at the Royal Geographical Society, June 5, 1905. Map, p. 368.

in such a land. Fresh routes opened up cast new light upon past events before almost incomprehensible, while travel and exploration act as a keen incentive to the historical study of regions traversed. Atoms of information gathered by successive travellers may, when pieced together, lead to valuable knowledge. That fact, and the hope of inducing others to follow in our steps, are the chief *raisons d'être* of this evening's paper. Time only admits of very cursory reference to many notes taken during nine years of residence and of travel in most parts of this Asiatic peninsula. The map shows the outline of the chief routes traversed, some of these passed over several times. Gratitude is felt to this Society for valuable instruction and for the loan of instruments. Also to all Turkish officials for their courtesy and aid, and to the population generally, whose proverbial hospitality is not in the least exaggerated. It is hoped that a discussion will follow in which gentlemen present may be so good as to take part to bring forward fresh points of interest.

The first difficulty which confronts the traveller is the want of a good map; none reliable is available to the public. To Kiepert we owe thanks for placing something in our hands and for an effort now being made to gradually correct that something. It is not to criticize that map, however, but to encourage other cartographers that I say how much there is yet left to be noted and corrected. It would be very satisfactory if we could encourage well-equipped and well-taught volunteers to go out more and more and to systematically map Asiatic Turkey by sections. Kiepert's new sheets are somewhat involved by a mixture of ancient and modern names. Indeed, the alterations take more the form of archæological additions than of modern topographical correction, perhaps because the information has been chiefly furnished by archæologists who have lately travelled more than the modern topographer. If the opinion may be offered, it would have been better had the modern been kept entirely separate from the ancient; had an entirely new map been built up gradually as reliable topographical information could be gained. It is only fair to add, however, that very great difficulties exist in that land to obtaining any information whatsoever, the first of which may be the want of knowledge of the language. It requires an exceptionally fine ear to catch a name mumbled out fast in a strange tongue. Geographical names are based on everyday objects: the "forty-ford" stream, the "grey-blue" stream, the "thousand and one churches" mountain, and so on. If you know the sense, it is easy to spell the word, otherwise it is often difficult to identify the place from the misspelt map. We have all suffered in Turkey from these mistakes, and they are some of the least important. But when the imaginative traveller puts down a village close to a road when it is in reality a mile or two off it the consequence may be a night passed out in the open, with neither shelter nor food, if you trust to your map

for the hoped-for lodging. Mr. H. F. B. Lynch's map of north-eastern Asiatic Turkey is a great advance on what has been before published, compiled with the greatest pains from very reliable sources and with great personal knowledge of the country. Let us hope that before long this valuable work may be extended.

But even upon Mr. Lynch's excellent map there are some routes not marked which I followed, and as an example of some of the difficulties which beset the mapless traveller let me tell you some of my experiences of travel between Erzerum and the Persian frontier. Starting from Erzerum, in the autumn of 1899 with my usual followers, a cavas, two servants, a Government zaptieh, and my baggage animals, I was determined to explore an alternative route to the usual caravan road to Van, which I had reason to think existed although it was never followed by travellers; this intention I concealed from the governor who might have attempted dissuasion. At Ertev the zaptieh was sent across to Hassan Kale for another warrior who should know the country to the south of the usual caravan road generally. When he arrived his appearance was not very awe-inspiring, some seventy years of age and evidently nervous. We never could pass such a way, he said, through a district of lawless, savage Kurds, where he certainly knew no road. We started, nevertheless, I promising protection to this arm of the law. I must here add that the zaptieh is generally a most useful, willing fellow, who assists greatly by his presence on the march. It proved to be a most interesting journey. For six days we journeyed on with nothing to guide us but compass bearings which showed the general direction towards Van. No Turkish official was seen as we passed through the territories of some eight very independent and warlike tribes of Kurds—the Kazkanli, Zirekanli, Sipkanli, Jemadanli, Zillanli, Hassananli, Berezanli, and the famous Haideranli—who either dwell or pass the summer in these parts. I must in gratitude say that to me all proved to be courtesy and hospitality itself in their kind reception.

From Hassan Kale to Arjish, or Aganz, on Lake Van, there exists no sign of government; the chief of each tribe is a law unto himself. It is only inter-tribal animosity which literally keeps him within bounds and prevents these Kurds from becoming an unmanageable force. A few tribes may combine but they are certain to be opposed by others to hold them in check. They now form Hamidie cavalry regiments; the sons of big beys are sent to military schools at Constantinople: it is hoped that greater civilization will follow. It is an interesting theme too long for our present time limits.

The plan of orientation on the road adopted was, as already said, compass bearing, as a check, on Arjish, towards Lake Van, and then to follow the best road available from village to village, or nomad camp to nomad camp, along that bearing generally. At night, half blinded by the smoke of a chimneyless fire kindled in the centre of the best

room of some Kurdish cabin, surrounded by the whole village, topographical notes would be amplified by questions as to the names of villages, streams, or hills passed that day. In the morning an escort of twenty or more dashing cavalrymen, mounted upon every description of ragged, half-starved beast, and firing "furious joys," or *feux-de-joie*, into the air, and sometimes into each other's faces, led us on our way a certain distance to put us on the right track. It is small wonder that these demonstrations proved too much for my "escort." My old zaptieh pleaded sickness, and begged to be left at Arjish, the first oasis of Government civilization he met. I readily consented.

Within the limits of each tribe it was not difficult to follow the

ARARAT, FROM BAYAZID PLAIN.

road, where all were eager to be obliging. But across the borders no one dare accompany us, and then it was only by following instructions given on the tribal boundary that the next village or camp could be found. In this way an excellent route was traced where wheels could pass without difficulty, the only steep gradient being the first rise from the Araks river. But as Government posts are not established caravans make a *détour* north. They do not want Turkish officials; my poor zaptieh could never pass here except with a foreigner or a very powerful armed force.

The chief topographical feature of this route is the Araks river south-east of Ketivan village, flowing east to the Caspian sea; it is about 35 yards wide where crossed, generally fordable here in summer.

Crossing it to the east we immediately ascend the somewhat steep slopes of the western extremity of the Sharian range which forms the watershed here between the Araks and Euphrates systems. The road goes up gradually, being steep only towards the top, yet carts could pass up zigzag. A few villages are dotted here and there in patches of cultivation, but trees, as everywhere else in Kurdistan, exist only near the rarely seen villages. At ordinary slow caravan, uphill pace of 3 miles an hour, the ascent occupies an hour and a half. The country traversed, generally, after this rise is an open, undulating, treeless plain, with occasional valleys and small streams and hills, no great obstacles. We cross diagonally the Kara Yazi, Kazbel, and Torlu uplands, towards the south-east, on a bearing towards the northern flank of the great Sipan mountain, a good landmark ahead. Villages are met with here and there but the population is sparse, and cultivation exists but to supply the wants of the people, there being no paying means of transport; the higher tracts serve as grazing-grounds round summer encampments. The general height of these uplands may be reckoned at 7000 feet, gradually falling to the Murad Su, or Euphrates, to the south. This river we reached to the east near Karaghil village, here about 150 yards wide, sometimes fordable, though a ferry plies; height here about 5000 feet, we having started at 6250 feet at Erzerum.

An intertribal fight witnessed was not the least interesting episode of this journey. Some flocks were being driven off across the Sipkanli Kurds' border when the usual alarm signals, shots fired and smoke fires kindled at all the villages around, brought clouds of horsemen galloping wildly across in that direction. This did not look very reassuring in the middle of so wild a country where a human life is never worth that of a good sheep, but we soon perceived, by the yelling Kurds with grinning faces who dashed past us, that to us no harm was intended. We reached the village not far from which the battle was raging to find the flat roofs occupied by all the women, who, quite regardless of stray bullets, followed the fluctuating fortunes of their side amid the din of their own shrill tongues, which almost drowned the thundering reports of the anything but noiseless or smokeless Kurdish powder. It was soon over, the flocks triumphantly brought back with the bodies of a few dead Kurds and some others wounded. We passed on amid the wailing of the women just widowed in a fight for a few sheep.

The landmark which for so long has been a guide far ahead—the great Sipan Dagh, an extinct volcano said to be about 13,000 feet high—looks now to be close to us, although a long distance off yet, south-east, on Lake Van. It is a most imposing mass rising from the plain which we are now crossing to the south-east of the Euphrates. We join the regular Erzerum—Van caravan road not far from this river and pass through Patnoz to Arjish and on to Van.

The latter part of the journey to Van and my subsequent march to the Nestorian country and visit to the Marshimun at Kochannes call for no special remark, these parts having been already so admirably described by Earl Percy. I will only say that in 1899, during my visit, the late Marshimun was still living and I found Kochannes quite an oasis on this rough and, one may say, dangerous march. We were entertained not only hospitably but charmingly by the old man and the Rev. W. H. Browne, who resided there, as well as by the present Marshimun and his sister, the latter a very attractive girl who spoke English perfectly.

From Kochannes a route north was followed by Bashkala and along the Persian frontier through very wild country with no apparent signs of lawful government, or indeed of anything much but of Kurds and stones, as far as Bayazid and Mount Ararat, at a point where three empires meet. On this road, to the south of the volcanic Tendurek Dagh, which has scattered great masses of lava for miles around, my Lee-Metford eleven-shot sporting rifle attracted the most covetous envy, one rich chief offering me untold gold and several good Russian rifles in exchange for it. I was not waylaid, as I expected to be, that evening after my refusal to part; and, indeed, I was denied all excitement of attack wherever I passed through this curiously interesting country. As no prominently high mountains are passed in this march north as far as the Tendurek Dagh, close upon 12,000 feet, the general impression given, in following roads but little less than 7000 feet in general altitude, with considerably higher points all around, is that the eastern limits of Turkey in Asia are not so elevated nor so difficult as many other parts through which we have passed. The road followed was not a difficult one for such a country and easy communications led across into Persia where the inhabitants were quite as friendly as on the Turkish side in the few cases where my way led me through their villages.

From Bayazid, 6700 feet, and Mount Ararat the main road was not taken to Erzerum by Kara Kilissa and Diadin, 6400 feet, south of which, in the Ala Dagh, rises in several streams the Murad Su—the eastern branch of the Euphrates. The northern side of this valley, hugging the Russian frontier, was followed by an easy track, with gentle gradients, as far as the Baliklu Geul—the "Fishy" lake—a not very large expanse of water full of fine trout, about 7400 feet high, surrounded by the mountain peaks of the Sinekle Dagh. Carts could pass anywhere on this road while at several points easy passages lead into Russian territory towards Erivan, Alexandropol, and Kars. The general height of the plain at the southern foot of Mount Ararat is about 6000 feet. All this country played a historic part of great importance in the Russo-Turkish war of 1877-8, when Bayazid fell to the Russians. A low ridge of hills, running from this lake south-east

to Diadin, is of great geographical importance in forming here the watershed between the Murad, or Euphrates, and the Araks rivers—the watershed between Mosopotamia and Central Asia, one may call it, in these parts. It is, indeed, interesting to think how the little parcel of earth forming here this low parting may have changed the history of south-western Asia by forcing the mighty Euphrates, at its source, towards the south from its natural course to the Caspian. The magnificent view as one follows round the base of the majestic Ararat, towering 10,000 feet and more above the plain, yet so impressively massive that it hardly represents its height of 17,000 feet, is one which well repays the traveller.

It was now October. A blinding snow with bitter wind served as reminders of the altitude and advancing season. From the lake a route was followed to Toprak Kale (Alashgird), not so good at first in descending as that traversed in the ascent and not practicable for wheels until the plain level is reached when it becomes good. Along here, also, fairly easy tracks cross into Trans-Caucasia, once the high and craggy Sinek Dagh are passed, as the mountains are called west of the lake, not Egri Dagh, as I see on some maps, which is the name exclusively reserved in Turkish to the Ararat group. It was here that an official asked my opinion of a nice Smith & Wesson revolver inscribed as presented to Frank Lenz by some American bicycle club. I returned it with the remark that it was a good revolver which might hang him. His companions looked at him curiously while he appeared visibly agitated. Frank Lenz was murdered near here a couple of years before while on a bicycle tour round the world and I knew the story. Up to now this individual was under the impression that the inscription was either the maker's name or an ornament. I crossed the Araks river close to where it enters Russian territory, returning to Erzerum again by the Passen plain and usual route. Many of the roads traversed are not marked on the existing maps and the difficulty may be imagined of tracing a way through such mountainous districts, in many parts depopulated, with no guide but one's instruments and an idea of the right direction.

Many routes followed might be touched upon, and with special interest in those parts north-east of Erzerum towards the Black sea through Lazistan. An account might also be given in detail, did time admit, of a journey to the source of the Kara Su, or western upper Euphrates, where, at a height of over 10,000 feet, it bubbles up from the mountain-side on the summit of the massive, undulating-topped Dumlu Dagh and flows down at once a considerable stream full of trout. Turning from the pool-source to look down from such an altitude upon this stream as it winds its way across the Erzerum plain westwards, to become, in the plains of Mesopotamia and towards the Persian gulf, the great controlling river of so many historical and political events, the

thought forces itself upon one that topography is indeed the foundation of history.

Like most similar spots the source of this great river is looked upon as a holy place, or "ziaret," by the Turks who offer sacrifices here on occasions; I assisted at such a ceremony. There is a story generally told in these parts how the Crusaders defended here the real cross which they were bringing back from Jerusalem, although nothing is added to explain why the Crusaders should have been crossing 10,000 feet up in the mountains; but it is interesting as showing how these wild tribes have carried down some hazy tradition of the passage of these warriors. It is interesting, also, to remember

TYPICAL KURDISH VILLAGE.

that the Ten Thousand passed not far from this spot. The Christians sacrifice sheep and goats here, and assemble from great distances around, at times, in pilgrimages.

There is but time left, before we cross down to the Taurus, to say that the frontier-line up north from here as far as the Black sea is generally difficult, intersected by fairly high and rough mountains, with no well-marked passages for roads. Wheels could not at present pass. But up the Kara Su valley, north-east, and towards Olti and Kars on the Russian side, easier passages exist. It is surprising over what country the local bullock or buffalo cart will travel; they went easily to the source of the Euphrates, and could pass over most of these southern parts, the mountains being round-topped and not rocky.

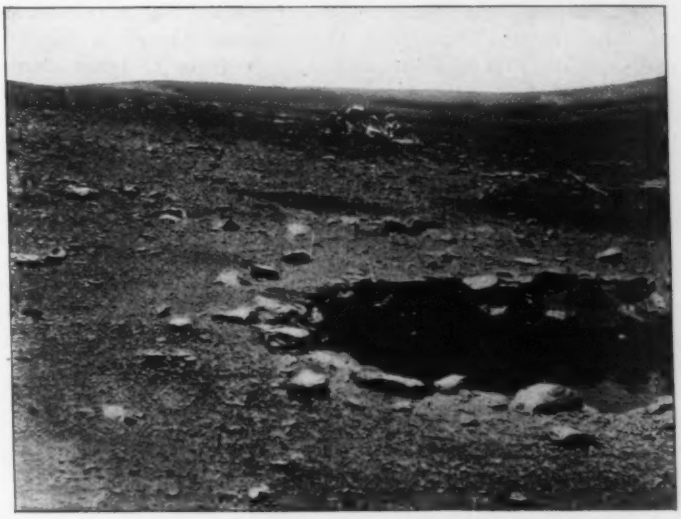
The country to the south of Erzerum, including the Palan Duken, or "Falling Pack-saddle" ridge, so called as it used to be very steep before the present good military road was made, and the Bingeul, or "Thousand Lakes" mountains beyond, a beautiful group, is most interesting. Leaving all description of the better-known routes I shall only allude to one which leads up the valley from Khunus to the north of the Bingeul Dagh and across the fairly easy country to the western end of the Palan Duken or Eyerli Dagh ridge. In this direction an easy road rises gradually to this ridge, passing a few villages where towards the end of winter supplies for both men and horses are scarce. The road rises to a pass above the Government salt-works which lie just north of the ridge at an altitude of close upon 9000 feet, then dividing into three tracks towards the north—to Erzerum, Ilija, and Ashkale respectively. Very little labour would fit this road for wheels and it is an alternative route to the Palan Duken pass well worth noting, one not traversed by many other Europeans. From this ridge the Bingeul mountains, from the thousand little lakes and springs in which the Araks river takes its source, form one of the most striking groups, cut up in every direction by deep ravines and crevasses formed by the melting of centuries of snow and ice; in winter as forbidding an abode as in summer it is a very paradise for the wandering nomad and his flocks. On all the roads followed abundance of water is as a rule available. It is one of the delights of the wild life associated with travel in most parts of Turkey-in-Asia that inviting streams and springs follow or cross one's path incessantly; indeed, water absorbs the place in conversation in that country which health does in this. The Turk is quite a judge of water as far as "lightness" and "heaviness" are concerned, that is, its digestibility or otherwise, although he cares but little what microbes or fever germs it may contain. As a rule the water is pure and excellent almost everywhere.

The most marked feature of all this Eastern district is the entire absence of wood, not from any natural condition as trees would evidently grow in most parts, according to species and to altitude limits, but owing to wilful destruction and neglect to replant. Firewood now comes four and more days' journey to Erzerum and is in that city the most expensive household necessity, while across the border, on the Russian side, there are magnificent pine forests. This regrettable destruction extends all over Asiatic Turkey, square miles of forest being burnt where as many square acres of clearing near some village are desired. Around villages great walls of magnificent logs rise up and around fields also, so that soon no forests will remain except in the most inaccessible mountains.

A word regarding the climate and seasons in Kurdistan may be of interest. The winter is naturally cold and rigorous at an altitude which may be reckoned between 6000 and 12,000 feet and much snow

falls in early November, burying everything for close upon six months during which nothing moves; men and beasts share the same semi-underground mud hovels where supplies are laid in. That is a short season; the snows melt, much rain often falls and then succeeds an almost tropically hot summer. Crops ripen early under the burning sun. Summer and autumn are the proper marching seasons, when supplies are abundant and roads in good order.

We now cross to the south-west, to the Taurus mountains and the surrounding country where questions of much topographical and historical interest await solution by future explorers. Let us consider the river system of Asiatic Turkey. A peculiarity which all the



THE SOURCE OF THE EUPHRATES, DUMLU DAGH.

greater rivers have in common is their considerable volume from the very source. The eastern branch of the Euphrates is a fine river as it descends through Kurdistan from the Alashgird plain, near where it rises; while the western, if not so great, is already a good stream as it passes below Erzerum to join the first-named above Malatia, there to force a joint passage through the final bulwarks of the main Taurus, the only river except the Tigris which flows south from this middle-eastern part of the chain. An interesting paper by Mr. Huntington, in the *Journal* for August, 1902, describes this passage; he raises a point of interest on the Anti-Taurus range. On p. 179 we read, "North of the plains" (evidently here the Malatia plain

has been alluded to) "lies the southern half of the Anti-Taurus mountains, in which may be included the great Dersim range." Here is a description of the Anti-Taurus quite strange to us who have seen this range displaced in descriptions, but generally assigned a position around the upper stretches of the Sarus river, or modern Seihun. I shall refer again to this presently.

Between the two Euphrates branches the Araks issues forth from the Bingeul Dagh, a fine river escaping north-east to the Caspian. These erratic courses suffice alone to give an idea of the complicated mountain systems of these parts.

If we except the Kizil Irmak, or ancient Halys, which drains the northern part of Central Asia Minor to the Black sea, the only other rivers of any importance are the Jihan (Pyramus), Seihun (Sarus), and the Tarsus river (Cydnus), which all descend through or from the Taurus to fall to the Mediterranean through Cilicia. I do not mention the Orontes, a fine river at Antakia (Antioch) but whose insignificantly short course is only an overflow from the lake a short distance above; nor the Calycadnus, or Geuk Su, at Selefke, more historically than topographically important.

The Jihan, or ancient Pyramus, rises a mile south-east of Albistan in a series of springs, alive with splendid trout; so great is the volume already at the very source that there are many mills above the town, and the river flows through it in two branches which form an island. It is joined close to Albistan by the Sogutle stream from the east. Strabo tells us that in olden days the Pyramus was navigable as it crossed the Albistan plain. I can believe it, it is so deep and still; but it would be for a short distance only as soon after the junction of the Khurman and Geuk Su streams the Jihan enters mountain glens and forms a very rapid river until it issues into the eastern end of the Cilician plain to the north of Osmanie.

The Seihun, or ancient Sarus, rises in two branches, both considerable at source—the Geuk Su, rising not far east of Azizie; the other, the Zamanti, to the south of Sivas and crossing the Uzun Yaila—fine rivers uniting some 40 miles to the north of Adana town, and receiving the Chakut stream 6 miles above that place. Prof. Ramsay has made this junction below the town (*Journal*, October, 1903, p. 385), but this can be but an oversight or slip. The Chakut, which we shall find again presently north of the Cilician Gates at Bozanti, has been joined a few miles above this junction by the Korkun Su, an interesting stream which has flowed down from the east of Nigde, cutting its way through the various ridges of the outer Taurus in short but deep cañons, while draining these mountains from the high Ala Dagh (the Red Earth mountain) to the sea. On these streams timber is floated down in rafts. I travelled down the Korkun for some distance on such a raft, reminding me of a similar experience on the much larger Cabul

river in Afghanistan, and down as far as Adana through the Chakut and Seihun, a pleasant mode of travelling, exciting as we shot the rapids at every bend. The Seihun is easily navigable for light-draught steamers from above Adana to the sea, but none come up.

The Cydnus, historically the most interesting of the Cilician rivers, has not a long course. Rising on the south side of the great Bulghar Dagh it works down a large and beautiful stream, abounding in trout from its source, through a comparatively easy course to the plains north of Tarsus. A central arm joins it from the north, while the eastern branch is the stream from the Cilician Gates which falls to the Cydnus

CAMP NEAR SOURCE OF EUPHRATES.

some 15 miles above Tarsus. To that branch I shall allude again presently.

A peculiarity of these three rivers is the change of direction of their lower courses towards the sea which was rendered, indeed, easy at the time by the very low level of the Cilician plain and its comparatively recent formation towards the coast. I traced the depression from north-east to south-west where the ancient bed of the Pyramus evidently passed, in many places very marked still to-day, from the present Jihan, a little north of Yakshi ferry, to the marshy ground west of Karatash, the ancient Mallus. At this point is another depression coming from the north-west, in which to-day lies a salt lake, with a small opening to the sea often choked with sand, stretching as far as Merkez, the

Government salt depôt, and several miles wide. Around it are marsh and reeds, the winter home of the only real villageless nomads (Turkmans), whom I have seen so far west; they dwell here in reed huts, grazing cattle and donkeys. This must evidently have been an ancient bed of the Sarus meeting the Pyramus close to Mallus.

It is difficult to see how Mallus can have been an island, as Sir Charles Wilson suggests (discussion on Prof. Ramsay's paper, *Journal*, October, 1903, p. 410), because a ridge of hills runs up to it and around it from the present Jihan bed on the east. The modern Karatash lies at this point below the cliffy extremity of this range upon which the lighthouse stands. The remains of the breakwater of the ancient harbour are visible as well as large blocks of stone and pillars lying all around. There is abundance of water, said to be very good, which even comes bubbling up from the sands around the bay. To the east, and south of the ridge of hills just mentioned, stretches a low plain, marshy in parts but gradually coming under cultivation, now one of His Majesty's farms, and a very paradise for the sportsman. The following short extract from my notes taken in November, 1901, is of interest regarding the Pyramus bed :—

"At 8¼ miles from Bebeli ferry" (on the track north-west, Bebeli to Adana) "Kizil Takhta village lies close to our road: fifty houses, three hundred inhabitants (Turkman tribesmen). At a mile, slightly north of east of this village, is Ak Diermen village, on the right bank of the Jihan flowing close here. Our road bends north-west at Kizil Takhta, and at 9½ miles from Bebeli ferry we cross the ancient bed of the Pyramus river which ran here south-west towards Karatash. It is now filled up but forms a wide depression, a marsh in winter. We cross a quarter-mile in shallow rain-water; to our left (west) a small farm and ruin on hillock. Yakshi ferry is seen 2½ miles to our east; then follows Egri Agach Kieli at 11 miles."

This would have been the natural course, south-west from below Missis (Mopsuestia). Was it with artificial aid, perhaps with intent to drain the Aleian fever swamps, that this river was turned off south, so that to-day, by the filling of its delta, it has taken an easterly course to the south of Ayas bay?

From Karatash, which my note-book marks as a fishing and small trading port of 1400 inhabitants, chiefly Fellah Arabs, Merkez lies 18 miles north-west towards the Seihun river. At this point I again refer to my note-book of the same date: "The sea-coast comes close to village of Merkez, 1½ mile off it. The country around here and south is marshy, with good soil farther north under cultivati n. The Seihun or Adana river used to enter the sea near Merkez, coming from Narkulak, Tuzgui Su to Merkez, and then flowing past Sarmesak and Taput to the sea at Zacha Bogaz. Another branch used to flow from Kuransher and, after winding, entered the sea as above. These

ancient beds are still easy to trace, the depressions forming marshes." In these parts it is very marshy still to-day and floods from the Seihun cause great damage to crops in wet years. This marshy state continues across as far as the present Cydnus bed, beyond which to the west we have the Tarsus marshes, the ancient Rhegma. The centre of this marsh is very deep; springs bubble up, and great blocks of cut stone are seen in this clear water. Here was the ancient port of Tarsus, not far from the sea of to-day. The depression of the old Cydnus bed is easy to trace. It was probably a fine waterway which led up to Tarsus and through which large ships might pass. To-day fair-sized sailing craft ascend to the modern town occasionally, the volume of

HEIGHTS ABOVE THE CILICIAN GATES.

the Cydnus being considerable except in dry autumn. Two thousand years ago these rivers were swollen with more abundant streams formed by increased rainfall in mountains densely wooded, where to-day the goat and fire have left bare the greater part. In those days Cilicia was a garden covered with fruit trees, beautifully irrigated. To-day Cilicia is God's fertile land, from which man takes all he can but returns nothing.

Before leaving the plain let us cross once more to the east and consider the ancient road which led from Adana by Missis to Issus. This road descended from the Cilician Gates at Sárishekh, gradually, to the south-east, and, following not far from the Chakut river, probably (its track is lost in the soft plain) reached Adana, a town prominent at

all times owing to its position on a conical, low hill in the plain close to the right bank of the Sarus river.[1] I have followed this road from Sarishekh and it is still paved in the descent but no doubt with stones renewed as they do not impress one as the ancient blocks. Across to Missis two high mounds divide the distance, used in ancient times as signal or guard stations. The interesting part of the road commences across the ancient Pyramus from Mopsuestia, or modern Missis, at the point where it crosses the eastern part of the Jebel-en-Nur by a passage in which the ancient roadway is still seen. It enters now the Hamidie plain which it crosses to Kurt Kulak, there being at one point a ruined bridge over a now dry watercourse. There are remains and great blocks of stone at several points passed. Proceeding south-east we descend the low hills and pass the ancient gates known as the "Cilician Gates" of the Issus plain, now called Demir Kapu, the ancient way turning now more east and reaching the ruins of evidently a very large city, to which a fine aqueduct led from the east, which then passed westwards to Ayas. These ruins are now covered by low trees, undergrowth and brushwood. They lie to the north-east of the extreme corner of the Gulf of Alexandretta and under the hills to the west of the Amanian Gates. A stream passes down from that direction to the sea, and a deep marsh follows the coast south for 10 miles, 1 to 1½ mile broad, bordered towards the sea by sandhills, to the east by low hills. Close south of this is a conical hill, now a police observation post, in ancient days the site of some town, and in all probability of Issus. Ruins in the shape of blocks of stone are all around this neighbourhood. The present marsh would have been a protected inlet or harbour in which perhaps Cyrus' ships found refuge. The distance from this point to the Syrian Gates, to-day Merkez, about 13½ miles, corresponds very fairly with the 5 parasangs mentioned by Xenophon when Cyrus marched from Issus to the same point. This position appears to be in accord with all evidence, and in examining the country carefully it is difficult to discover any more likely site. The ruins alluded to just now to the west of the Amanian Gates might well be those of Epiphaneia.

We must all agree with Sir Charles Wilson's opinion, expressed in his notes on Asia Minor (*Proceedings*, June, 1884), which, if not the most recent, are amongst the most valuable records we possess, that the ancient Pinarus stream is the one which, issuing from a deep cleft in the Amanus range, crosses the plain here in a somewhat narrow part and falls into the sea at the modern Payas, the ancient Baiæ, to-day a large Turkish convict prison well worthy of a visit. For future travellers the entries in my note-book are interesting that close to the Deli Chai, not far from the point where I place Issus, is an ancient bridge in a dry field, showing that the stream has slightly altered its course, and that on the coast, 2 miles south of the Karanlik Kapu,

or ancient "Cilician Gates," is a small sheltered bay with remains of ancient quays, an old castle and other ruins.

In reading the history of Cilicia, we are struck by the predominant part played at all times by sea-power in connection with that country; command of the sea meant general supremacy, and topographical considerations make the reason clear. A force based upon the sea could alone effectively hold this rich plain, with the sea on one side, a high mountain barrier with few passages on the other three. History furnishes scores of examples. In the first century B.C. we find the whole Government system of several provinces disorganized, because the pirates held command of the sea along the Cilician coast. In the march of Cyrus with the Ten Thousand, he having command of the sea and Artaxerxes' troops holding the Syrian Gates at the narrow passage between the Amanus mountains and the sea just north of Alexandretta, Cyrus threatened to move his troops down the coast by sea from a point near Issus to turn the gates and take the enemy in reverse. The result was victory, the enemy retreating.

The same geographical conditions hold good to-day; to the east and to the west of the plain, near Alexandretta and Selefke, the mountains come down close to the sea, turning the only possible passages for roads into defiles.

The chief interests of the Taurus chain still centre around the ancient and beautiful Cilician Gates pass. Historical arguments connected with it are still often based upon imperfect geographical knowledge, however, and errors naturally result so that many interesting problems remain yet to be solved. But we are by degrees approaching facts and our successors will shortly reap a rich inheritance.

Prof. Ramsay concludes that Cyrus descended through the Taurus along a route following generally the direction of the Chakut river, and did not take the Cilician Gates road from Bozanti (Podandus) to Tarsus. On p. 388 of *Journal* of October, 1903, we read, "Cyrus climbed the mountain" (the outer or southern Taurus slopes are here referred to, evidently) "where the stream" (the Chakut) "goes under it, descended the other side, and was then obliged to follow the river for some distance, and at last turned away south-west to Tarsus. In this way he would have about 60 miles' march to Tarsus after he had descended into the low ground from the mountain." As all this section of the Taurus was carefully studied by me for topographical purposes during a journey in June, 1903, the following remarks, which are based upon copious notes taken, may assist us in clearing up this and other points.

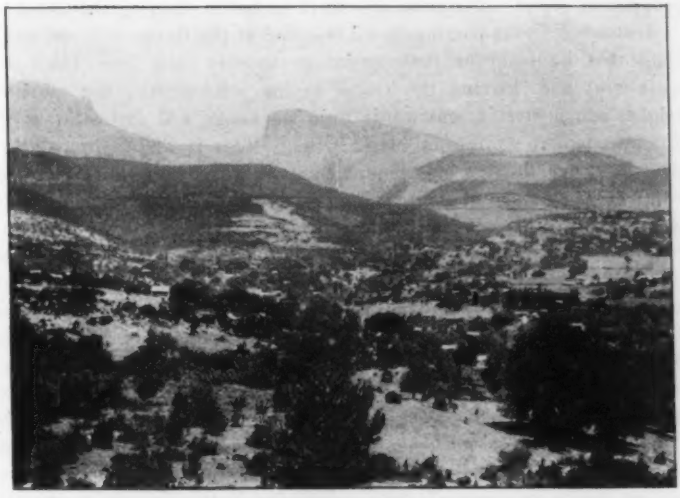
The route followed by me was from Tarsus eastward to Yeniji, a station on the Adana railway, a fraction under $9\frac{1}{2}$ miles. The post from Konia to Adana comes down to this station and we shall meet its route again further north. Leaving Yeniji at 4.20 a.m. on June 23, my notes show that the track followed led slightly west of north (bearing

350°) up the valley of the Koja Dere, rising slightly, sometimes dry, at certain seasons a torrent, and over two easy cols at a height of 800 feet, passing an interesting old castle, the Kutukle Kale to our right, the Kiz Kale castle lying off to our west. At 15¾ miles from Yeniji we cross the road which passes here from Adana (south-east), up the Chakut river valley, to Sarishekh and the Cilician Gates to the west. At 19¼ miles, always on the same general bearing and having come an easy path through cultivation and low limestone hills, we reach Polatle, a small village of twenty houses, height 1300 feet, at the base of the southern slopes of the Haider Dagh, the name given to all this outer ridge of the Taurus range from the Chakut river to Sarishekh and the Cilician pass.

It is here that the plain ends and the mountains commence. We are now $9\frac{1}{2} + 19\frac{1}{4} = 28\frac{3}{4}$ miles from the centre of Tarsus by a very circuitous route. By a direct and just as easy a way it would not very greatly exceed 20. We are close to the right bank of the Chakut here, which flows within sight in the valley to the east. I do not therefore see any topographical reason why the ancient road to Tarsus or Cyrus' march should have gone round some 60 miles after descending into the low ground from the mountains, which end here very distinctly at Polatle and at the point close east where the Chakut enters low hillocks on the north of the Adana plain. My notes show that from Polatle a rather steep and very stony ascent leads to Alchak Gedik, the "Low Pass" village, on a col 1800 feet, with no water close here. This is the outer Taurus wall. Do not let us lose sight of the fact that some of Cyrus' light troops had crossed the Taurus from the north-west diagonally towards Tarsus, and that the news of the approach of these troops, as well as of Cyrus' fleet, caused Syennesis to abandon his Taurus defences. It is hardly conceivable that Cyrus would have made a *détour* 60 miles eastwards, thus allowing the enemy to wedge in between his army and the troops he was expecting to join him from the west.

From Alchak Gedik we cross into the Chakut valley, here called the Giaur Dere, and continue now on a bearing 350°, the track descending gradually. There are some old castles here and there, as in most parts of the outer Taurus. The country is intricate with no trace of an ancient road. Rising and descending, the highest point crossed being 2000 feet, we reach the point where the Chakut passes underground, the "Earth bridge," Yer Kupru, as it is locally called: height of river here, 1100 feet; distance, estimated in miles over a mountain track, being 10½ north of Polatle. This passage under the earth is nothing more than an ancient landslip, which has covered the river for a length of from 180 to 200 yards, forming a bridge of earth and rock some 15 to 20 feet thick, and 40 feet over the stream, upon which trees now grow. The bearing of the stream below is 150°; above it is 235°,

through a very narrow, precipitous valley, with pine forest overhead. No path leads up this narrow gorge, steep rocks reaching to the water's edge. There is no sign of anything but goat-tracks around and these lead over the surrounding mountains 6000 feet above. I remained once for a week in this valley with the German engineers who were making the tracing for the passage of the Bagdad railway extension, and I passed in every direction over these rugged and precipitous mountains in pursuit of ibex. The engineers could only move as they cut a passage for their feet in this rocky glen and no ancient route appears to have passed through it. Tracks crossed the mountains at all times,



NAMRUN.

no doubt, but none to tempt an army from the natural Cilician Gates direction.

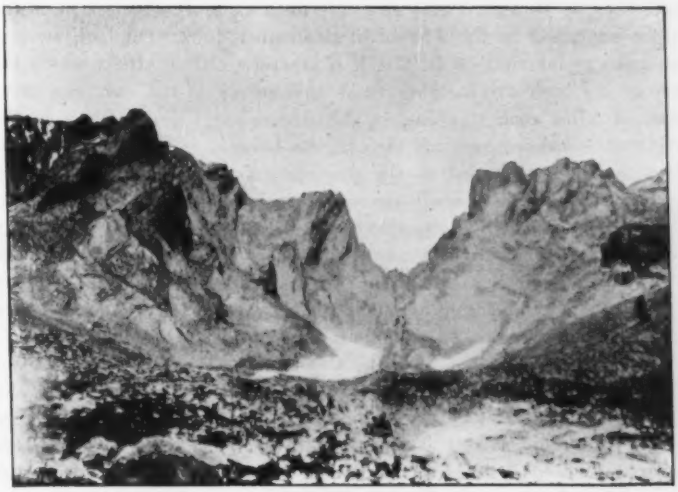
In order to get out of the valley from the "Earth bridge" and to reach Bozanti a very difficult march must be faced where lightly laden pack-animals can scarcely follow. Moving up the valley north-east we gradually ascended to a height of 4500 feet, making a considerable *détour* to avoid the steep cliffy sides of the valley more west. Here we crossed a pass and descended to a tributary of the Korkun Su, a descent of 2000 feet; up again to another col 4000 feet; down again, and again up to 4300 feet to Ekejik, a woodcutters' yaïla, or summer village, continuing up to 4900 feet, finally descending north-west to the Chakut valley in the Belemedik district, that river being crossed at 2200 feet. If this stream is not swollen the valley can be followed north-

west to Bozanti by crossing several times in the water, generally very deep. This was not possible at the end of June when I travelled and only by good luck were we not washed down at the ford where we crossed. We had to ascend the western mountain ridge to a col 4000 feet, to the east of Anasha, and then down through that village to Bozanti, height 2600 feet at the stream-level. At the end of this march my pack-animals were all but dead; yet this was the easiest route to Bozanti! Had a track over Anasha to the west of the Chakut been found and followed no less difficulty would have been experienced. I maintain that there is no way here except over high and difficult mountains and if Cyrus chose this route he did so with some deep and unapparent object. Distances also fit in no better than by the Gates.

Instead of Cyrus passing down the road at the Gates, is it not more likely that he took the route crossing the easy plain from Tekir col south-west and, leaving the Gates to his left, skirted the massive heights which stretch westwards from the Gates, and down the valley which leads here straight on Mezar Oluk? This is the Shahin valley. My note-books tell me of splendid camping sites, with abundance of water for troops, and of the advantages of the road with easy gradients and a low col 4500 feet high to the south-west corner of the Tekir plain. This road could be easily made passable for wheels to-day. Indeed its topographical advantages lead one to the conclusion that in ancient times the passage of the road through the narrow "rock gates," and then down a difficult defile south, was made purposely for the purposes of defence, the easy passage round to the west just referred to being, doubtless, carefully guarded and blocked. I personally lean towards the idea that Cyrus passed down the usual road after the enemy had retired owing to the turning movement led by Menon from the west, and the heights alluded to which were climbed would be those to the west of the passage, which are comparatively easy to reach, those to the east most difficult. It might have been quite possible from here to see the tents of the troops who had been guarding this line previously, and other heights lie again to the west and farther south. If the defence was suddenly abandoned, as it appears to have been, tents could hardly have been removed. It is probable, therefore, that Cyrus' army passed both through the Gates and over the heights. (Let me just add that around and on the Tekir plain, north of this passage, Ibrahim Pasha's defences are still in very good order. I counted a considerable number of cannon lying about in the autumn of 1902, and noted their marks, some having the broad arrow and crown. I made Tekir col 4200 feet; Major Bennett and Colonel Stewart say 4300 feet, Ainsworth 3812 feet, Oberhumer 4607 feet, Prof. Ramsay 4240 feet. We may fix it as not far from 4250 feet.)

But whether Cyrus passed by the Chakut valley or the gates or by a route west is hard to decide by reasoning based upon distance which

starts from a point not yet fixed. I maintain that in the present interesting case this fixed point is, as in every other case in such measurements, the last one mentioned, here Tyana or Cyrus' camp in its neighbourhood. We must read Xenophon's description of the events as a whole, and not dissect it in order to take his distance of (25) parasangs as beginning after reaching the Cilician plain. No point can be found to fit in with this latter theory unless a march round almost to Adana be supposed before the final advance on Tarsus commenced, which is obviously improbable. While at his camp near Tyana the messenger reported to Cyrus that the defence of the Gates was abandoned. Why should he not take that route, then, and by what other could his chariots



SUMMITS OF THE TAURUS.

pass? We read that he ascended the mountains and saw the tents. These he could not have seen from the Chakut valley. He descended through a large and beautiful plain 25 parasangs to Tarsus. This may well be taken to mean that while descending through this plain his march was that total distance, but not necessarily all in the plain. In fact it would be his four days' march from his last point—his camp near Tyana.*

Prof. Ramsay makes the shortest route Tyana—Tarsus fully 95 miles. Murray (p. 165) appears to give a quite correct route as follows: Tyana by Paraaon over a ridge 5450 feet, by Imrehor and Gurji Kale

* Since writing this paper I have consulted Ainsworth's 'In the Track,' etc., and find that his conclusion is the same as mine.

to Bashmakji (4¼ hours); past considerable ruins, the ancient roadway being plainly visible, reach Takhta Kupru (5 hours); and on to Gulek Bogaz station (15 hours) this being 1½ mile east of modern Tarsus. Total, 24¼ hours plus 1½ mile, or 74¼ miles at 3 miles to the hour. The ancient road was more direct by Bairamli; old Tarsus extended further north, probably, and Cyrus' camp may have been towards the south of Tyana plain. To me it is easier to reconcile this as being the total distance marched by Cyrus from his last halt than to trace a route of over 60 miles for his army from no matter what point at which he entered the Cilician plain until he reached Tarsus.

Prof. Ramsay is perfectly correct in stating that the passage of the Cilician Gates has not been widened in modern times, as it was said to have been by Ibrahim Pasha so lately even as in the discussion on the paper published in the *Journal* of September, 1902. On both sides of the passage inscriptions in Greek character exist—to the west on the side of the high overhanging rocks themselves, to the east on a great mass of fallen rock standing in the stream-bed a few yards from the roadway. Perhaps here the stream was covered by a viaduct in those days to widen the road at the passage. No doubt the roadway had fallen into disrepair at many times, but it was comparatively excellent a couple of years ago, and carriages passed easily, thanks to the energy of His Highness Ferid Pasha, the present Grand Vizier, who, as Governor of Konia, controlled its repair to Ak Kupru, the frontier of the Adana vilayet, in passing through which the governor, Bahri Pasha, also a painstaking official, looked after its care.

On pp. 368 and 370 (*Journal*, October, 1903), Prof. Ramsay mentions the fact that the modern road to Tarsus does not follow the stream from the Gates all the way down. The reason for this is a very simple topographical one as this Eastern branch of the Cydnus river flows to it some 15 miles above Tarsus in intricate hilly country, and no road for wheels would choose such a direction. The road seen south of Mezar Oluk ascending the opposite hillside does not lead directly down to Tarsus but goes across the hills to Namrun.

The traces of the ancient way are clearly seen to-day in the pass above Sarishekh. That place derives its name very evidently from Sarekle Sheikh, the "green-turbaned" Sheikh—in other words the Holy Sheikh as green is the Moslem religious colour. It has nothing to do with "Sare Eshek," the "yellow donkey," and Langlois was right. The connection is clear between this name and the "türbeh" or "ziaret," or holy shrine, mentioned on p. 371 (*Journal*, October, 1903), located here. That this point marks also the junction of important roads is self-evident from its topographical position. The valley down by Mezar Oluk, in which the modern road passes, is narrow and steep compared to the more open passage south-east, which holds the modern post road from Adana and in which I have met the mail travelling. The road is

paved in parts, probably from Ibrahim Pasha's time; it was evidently at all times the main way to the Gates from the Cilician plain. The ancient road to Tarsus probably passed down here over comparatively gentle slopes, and also the Adana road which bore off eastwards when the Tarsus route turned south, as it did very soon, to pass down the easy valley leading towards the ruins lying to the west of Bairamli. These ruins, only recently visited by me, are on a high plateau stretching between the Cydnus river west and Bairamli, and covering an enormous extent of ground. They represent either the ancient summer residences of Tarsus or the great military camp for its defence towards the Gates. I traced the old paved way through it by the

THE TAURUS.

triumphal arch still standing and down towards the plain south where it is lost in the soft soil; but it could have passed anywhere to Tarsus where that city then lay as no obstacle intervenes. Standing south of the slopes below Sarishekh and looking north as one travels, the way just mentioned is the natural one evidently for the road. It is direct and easy, the present road bending considerably round to the west to gain the valley; an ancient way passed here also, perhaps, but hardly the chief one.

Around the Gates and to the north the mountains are of exceptional interest. They are here cleft asunder by two great natural passages, the valley leading north towards Kaiserie and the passage from west to south-east of the Chakut river. Taking those to the west of the northern valley first, we have the square-topped, not very high block close

to the Gates as far as the Shahin valley west, which drops abruptly on its northern flank to the 4000-feet-high Tekir plain, across which we see the Bulghar Dagh rising gradually to the north and north-west. This great mass is the real backbone of the Taurus range from this point westwards for a considerable distance. Here on the south and east it is not precipitous; it rises gradually in well-wooded and watered hills and valleys to an average height of over 7000 feet, from which the high rocky peaks or sugar-loaf summits continue up to above 11,000 feet. On the north side, which extends along the line of the Chakut river and to Eregli, this mass is precipitous almost throughout to its base. As we follow the valley north from Tekir the Bulghar Dagh prominent points seen are the Ruzgiar Tepe, Kochan Dagh, and Giaur Dagh, all about 7500 feet. Just north of the Ak Küprü (bridge), across the Chakut, rises the Karancha Dagh, a prominent conical mountain about 7000 feet. After this, on the west side of the valley leading north towards Kaiserie, there are no remarkable peaks, the range, which is here volcanic, becoming bare, treeless, and uninteresting in appearance, falling gradually towards Nigde and the plains round Develi Kara Hissar. At the gates to the east we have the Hajin Dagh, steep and craggy, about 6000 feet, extending north as far as the Chakut at Anasha, and forming the western boundary of this stream as it descends towards the Adana plain. To the north across this river rises the beautiful Ak Dagh, some 8000 feet, followed by the Karanfil, 9500 feet, all parallel to the valley, which leads slightly east of north to Kaiserie, narrow at the bottom and only 2 miles across from peak to peak, forming one of the most picturesque routes in the whole Taurus range.

It is very important to note how the main chain has here turned northwards for 20 miles from Bozanti Khan to the Ala Dagh beyond Jevizli Khan and the Karanfil Dagh. It is the Ala Dagh, or Red mountain, a most beautiful and striking group, rising up and extending from the valley we have been following, which leads the Taurus back into the original course eastwards. My notes tell me how I turned from the Jevizle Khan, height 4200 feet, up a steep rise on a general bearing of 60° to a col 8000 feet which separates the Ala from the Karanfil mountain. There are juniper trees about here. The track now undulates along the southern slopes of the Ala at a general height of from 7500 to 8000 feet. This is the summer home of many semi-nomads, or Yuruks whose winter villages are below and who pass a delightfully healthy and bracing summer in tents up here. I note that we are on a general bearing of 70°; in many places there is snow below us in the deeper ravines (June 29, 1903). On p. 390 of *Journal*, October, 1903, in a note, there is a question as to snow lying all the summer on the Ala Dagh. I should say that it would do so in the deep clefts on the northern side, but certainly not over any part of the exposed, open

summits. These tower above us, grey and bold, as we pass along a route parallel to them; while the valleys beneath us stretch away to the south full of the most lovely and varied wild flowers, rare bulbs, new species of orchids until lately unknown to us at home but now to be found in Kew Gardens. Pine and cedar-covered hills, with clear trout-streams gurgling down between, slope to the great Adana plain; everything appears to combine to make this one of the wildest and at the same time in summer one of the most beautiful parts of the Taurus, stretching away eastwards to the Seihun river and beyond. Forest begins at 7500 feet; at 6500 feet, grows densely, while juniper is found still higher. This part of the world is unknown to all but the nomad and to two or three Europeans. The traveller Tchagachef crossed it from south-west to north-east once many years ago. I have been over and through it several times and so has Prof. Siehe, a very learned botanist with whom I have had some pleasant journeys and who is well known at Kew.

I note that one col crossed was 8200 feet. The highest Ala peaks—the Demir Kazek and Chakur Dagh—are 10,500 feet and 10,000 feet, or perhaps more. They lie over the Ajiman Yaila, 6500 feet, where ancient ruins and Greek inscriptions denote the wealth of the copper or iron mines around. From the Adana plain or the sea the Ala Dagh stands out a remarkable feature, especially when white with snow in winter.

One of the greatest difficulties experienced in my passage was from the kind and too constant hospitality of the occupants of the numerous groups of tents through which the road lay. At each the invitation to "bouyouroun" or to rest and to partake of coffee was renewed. They were overjoyed to find a stranger who could give them news in their own tongue, apart from their innate desire to be hospitable. To refuse their kindness would be rude, yet to accept meant an interrupted and slow march. Here, as indeed everywhere, the people are most friendly to any one who understands their ways and meets them halfway.

At the tents where I stopped one night I note that the headman, or "agha," was Mahmud Agha, from a village on the Chakut stream just above Adana town; another was from Chejeli on the plain, a third from below Karsanti; all from permanent villages. This brings us to a point of some importance in which so many are interested, namely, the nomad question. In my opinion there are no real nomads left in the western and northern parts except the few Turkmans who wander about almost as beggars from village to village. The nomad has become a settled villager who wanders only in summer when the vermin of his home drive him and the green pastures and cool waters of the mountain invite him to take to his tent and climb. I have seen no real nomads in these parts during nine years of travel, if by that word we mean perpetual tent-dwellers. All the villages of the

Cilician plains furnish the summer Yuruk and semi-nomad of the Taurus pastures and valleys. I think the real nomad now dwells only in warm parts such as Mesopotamia. Up north, having felt the comfort of stone or mud walls in winter, and of a roof, tent life at that season has become a joy of the past. Pages might be written on this subject did time permit; let me just add that in all my travels in the Taurus I met "friends" whom I knew in their villages in the plains. The Taurus is a perfect desert from October to March and in the plains all now dwell under roofs.

To return again for one moment to the Ala range, it is impossible to give here all the details noted but before leaving it the fact that it bears generally 70° to 75° must be emphasized—that is, slightly north of east. This continues almost to the Zamanti branch of the Seihun river towards Farash, where the eastern flank of the group rounds off. On all the maps I have seen the Ala Dagh is quite wrongly shown as being parallel to the almost north and south valley leading towards Kaiserie, doubtless because these parts were not explored. I have even seen the Ala Dagh included in the Anti-Taurus which is quite wrong. An erroneous impression of the whole range is thus given as it must appear to break off here, the country to the east of the Hajin, Ak, and Karanfil peaks being comparatively only low hills, and the Taurus minus the Ala group would be invertebrate indeed.

The Anti-Taurus commences beyond, that is east of, the Zamanti river, running north by Shahr and Azizie, including the Binbogha Dagh, the "Thousand bulls" mountain to the west, very often misspelt as "Bimboa," doubtless through ignorance of its derivation. Similarly, between Adana and the Ala Dagh the Pos Dagh, meaning bare or bald mountain, is misspelt Post. Hundreds of such cases might be given. The main Taurus is lower east of the Ala Dagh, as it crosses by Zeitun and south of Albistan, but it is a well-marked chain, nevertheless, in which all around I know of points which rise steep and craggy to 7000 and 8000 feet and more.

We left the Bulghar Dagh rising high to the north-west of the Cilician Gates and bearing off south-west. This great mass is a curious mixture of rocky peaks, rounded heights, deep precipitous valleys and easy passes. The highest points are towards its eastern extremity and the centre, to the south and south-east of Bulghar Maden ancient silver-mines. Here the most prominent are the Baimak and Choban Huyuk peaks, both 11,200 feet high, with the Kizil Tepe a little more to the east and not quite so high. This is a magnificent group which can be ascended from the Cilician Gates neighbourhood. Proceeding up the Karle Bogaz, or "Snowy Gorge," I reached the top of this valley by a fairly easy horse-track in four hours and a half, height 6300 feet, with tents of the Gulek villagers now up here (August 4, 1902). Riding on up a zigzag path along the now steep Bulghar Dagh slopes the Keche

Bel or pass is reached at 8300 feet which leads the track westwards to Bulghar Maden. We turn north here up a less steep path, passing the Geul Kar Geulen Tepe close to our right, 8800 feet, and reach the foot of the highest point in the Bulghar Dagh at 9400 feet. Here we leave the horses, and ascend on foot the round dome-shaped Choban Huyuk, which rises more and more steeply until the summit is reached. This is the highest point, 11,200 feet, from which a magnificent view is discovered all round—to Nigde and the Argæus mountain to the north, and to the sea south. The ascent is fairly easy from the south but craggy peaks tower nearly to the same height around, and on the

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north all is steep and precipitous. Snow lies deep everywhere on the northern side in the crevasses. This ascent is interesting especially as fixing the height of this part of the Taurus range, until now always under-estimated and sometimes as low as 6000 feet. It is really the highest part from the Mediterranean to Lake Van if we except Erjias Dagh or Argæus mountain, which is entirely separate from and to the north of the main chain.

Towards the west these mountains continue as a great mass at an average height of 10,000 feet, with low peaks rising here and there to 10,500 feet; and it is not until nearing the south of Egreli that any marked diminution of elevation is noticeable. The range then assumes the shape of enormous undulating downs or uplands upon which shepherds

wander in summer and the moufflon finds young grass, while the ibex, or wild goat, prefers the rocky precipices in the valleys below. The Dumbelik Dagh follows to the west at a height of 8000 feet, gradually lowering westwards, until south of Karaman the average is 6000 feet, with a few points rising to 7000 feet. This closes in the Cilician plains to the west at the sea by Selefke. The general geological formation is Tertiary limestone in the outlying hills to 7000 feet, here and there some sandstone, then the higher mountains are Silurian metamorphic limestone. Favosite coral, columnar, metamorphosed into marble, and many fossils, are found at about 7000 feet, above Namrun.

The only wheel-tracks across the Taurus and Amanus range passes or roads to-day are Selefke to Karaman, the Cilician Gates, the Beilan road from Alexandretta to Aleppo, and the Sivas-Diarbekr road. The first is not in very good repair, but the three last are in quite fair order. Another cart-road is being made from Sis, *viâ* Hajin, to Sivas, and a sixth wheel-track from Malatia to Marash and Aleppo. Horse-tracks cross in every direction and at many points, so that any special mention of the dozen at least which I have followed from Malatia, Albistan, Sivas, Geuksun, Kaiserie, Eregli, Konia, Karaman, or Haleb (Aleppo), to the Cilician plains, would fill more space than we can now spare. The Taurus south of Malatia presents another beautiful, interesting and but little-known group. I crossed it in October, 1902, following from Marash a very fine ancient road, said to be a Turkish one from the capital to Bagdad, but probably remade over the Roman road from Geuksun and the Anti-Taurus. At Belveren it branches off south-east to Samsat, the ancient Samosata, to be joined by another ancient road, which passed south, to the east of Adiaman, from Malatia. I left the old road at Belveren, north of which an easy valley leads up to Malatia where the new wheel-road is passing as it comes south to Aleppo, and I followed east by Besne to Adiaman, the track being easy all this way. Here I struck directly north, following generally the line of the telegraph-poles to Malatia by a road marked on no map and probably never before passed by a European. It is a wild and lovely country, inhabited by Sunni, or, according to Turkish Mohammedan ideas, orthodox Kurds, a scant population, living in villages in valleys in winter, becoming tent nomads in summer; to me most friendly and hospitable, although sometimes attacking Government officials. The total distance across is 68 miles by a track bearing slightly west of north, rising up the Taurus at $2\frac{1}{2}$ miles from Adiaman, a well-situated town of seven or eight thousand souls, 2600 feet above the sea. Then follows a rise, then a valley, after which we climb for some 10 miles to the Yailajik pass, 5600 feet, and again descend, bearing forward here 330°. So we proceed, up and down, by lovely valleys and magnificent mountain passes, the highest crossed being the Merkezer, 6250 feet, and the Su Batan Bel, 6450 feet. After

this last passage we begin more gradually to descend. The geological formation is generally Tertiary limestone, with much conglomerate. One peculiarity is of interest. To the west, over Cilicia, the Taurus is more steep and rocky on the northern side, whereas here we have easier and more rounded slopes as we advance towards Malatia, north. The highest peaks around this route were the Külbe Dagh, estimated at at least 8000 feet, and the Su Batan Dagh, 7500 feet. The route is a mountain track which about half-way bends round again slightly east of north. Two interesting streams are passed near the Su Batan pass, one which disappears down a cleft to issue out again far down a

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valley, and the Malatia stream, gushing out of the rocky base of a mountain by the road-side and flowing down a nice river from its source, which gives the town below the gardens and fruit for which it is famous, before it enters the Sultan Su and the Euphrates to the north and east, a few miles away. Another track between these towns passes slightly east while the ancient road crosses farther away by Kiakhta.

To two other passages only across Taurus shall I allude: the first in connection with the Hittites and their art, upon which we, who have seen their traces with our own eyes, are especially anxious to throw light where possible. We know that their rock-sculpture and hieroglyphic

writing extended as far as Pteria to the north and to Beyshehr beyond Konia to the west. Prof. Ramsay's references to this people, on p. 35 of his 'Historical Geography,' are most interesting. He states that Syrian Hittite art shows greater development and a later date than it did in Asia Minor. Could it have been that this people had extended north at an earlier period and were driven back south before a new and stronger rising power? Or did they just come up to this high ground in summer to avoid the Syrian sun as the Yuruk climbs the mountain Yailas with his flocks still to-day? On the same page we read that an important road probably existed connecting Pteria with Assyria by the Anti-Taurus region and a pass between Albistan and Marash. This is more than probable. Its natural direction would be up the flat valley between the Kurt Dagh and Amanus range, so easy that carts pass over all parts to-day south of Marash. Beyond that to the north there is quite a choice of routes; I having crossed the Taurus here myself by four different tracks. Of these the one I am most inclined to select for the ancient way crosses the Jihan river west of Marash and follows a generally easy line by Tekir Khan and over the Ayer Bel to Geuksun, distance 54 miles. The only obstacle is the Ayer Bel, or pass, 6600 feet high, but the ancient road turned this certainly by making a *détour* round east where there is a very easy and low passage by the valley between the mountains. At Geuksun we meet the ancient Roman road to Albistan from the Anti-Taurus in which range several easy passes exist for the Pteria road to have traversed. In the valley south of Marash, already referred to, we see at Zinjerli, close to the Baghche pass across the Amanus range, some Hittite remains lately excavated where two large stone lions and many other objects were found. They are not extensive, so far as it is at present ascertained, covering a small knoll in the plain. They may have represented some monument, gateway, or military post on the ancient road. Bearing on Prof. Ramsay's theory it is important to note that west of the Amanus and south of the Taurus, that is, in Cilicia, I know of no remains which can be said with certainty to be Hittite. Their road lay as indicated; they probably did not cross the Amanus westwards to encounter what would have been at all times enemies from across the seas or pirates settled on the Cilician side.

The last passage across the Taurus to be alluded to is that by which Cyrus despatched Menon and his light troops which turned the Cilician Gates in their descent upon Tarsus. Ainsworth, in his commentary, gives the route as passing Kizil Chasmah, Alan Buzuk, Mazatli, Soli, or Pompeiopolis, and onward to Tarsus. I do not know from what source this information is taken, nor do I recognize the first two places named although all these parts have been examined by me, but I am under the impression that Mazatli, Soli, and Pompeiopolis are one and the same. Most probably the bend south towards Karaman, the ancient Laranda,

was made to avoid the direct passage from Konia to Tyana across the comparatively desert plain, the Axylon. We read, I think in Strabo, of the fertility of those parts around Laranda, and of the beauty of the forests. Cleopatra is said to have been given a forest of magnificent cedars not far south of this from which the masts for her Egyptian fleet were obtained. It is sad to relate that the Karaman plain to-day stands treeless, the rain and water supply thereby reduced; and passing through Cleopatra's cedar forest a couple of years ago I found its remnants lying in ashes around, a fire having just occurred. If Menon branched off here south-east he would have had a choice of two direct and easy routes to Tarsus; the more northern from Karaman to Ibraila, Korash, and across the broad, flat Dumbelik plateau, down the easy pass of that name by Chatal Cheshme (where the ancient road remains to-day in fair preservation), and on by easy gradient to the plain north-west of Tarsus. This is a remarkably easy way; no doubt in ancient times chariots could pass. Further south an equally easy road passed by Maghra and Efrenk, joining the one just mentioned south of the Dumbelik pass, and which traversed a more fertile district. There are ancient ruins and inscriptions on both ways. The Pompeiopolis road would lead down to the coast south, causing a great *détour* and being steeper. It is difficult to trace a reason for such a diversion.

The passage of some of those ancient roads to-day, especially of those in wonderful repair leading from the coast around Corycus and the ancient island of Elæusa towards Olba, suggests at once the thought of how horses' hoofs were treated in those days for passage over such great blocks of smooth stone. It would appear that they were not shod. In endeavouring to solve the interesting question as to when horseshoes were first used, I made inquiries at the Quirinal Museum in Rome last autumn, and found that this was apparently in Marcus Aurelius' reign (161 A.D.), and the proof lies in his own equestrian statue in that museum, where his horse's uplifted foot shows the shoe with six nails, whereas previous sculpture only gives the uncovered hoof. This is hardly an unnecessary digression as the subject must interest all of us deeply who have wondered as we looked upon such roads. I have to thank the British Museum also for information on this matter.

The last completed section of the Bagdad railway extension is now open to traffic to a point a little east of Eregli. Crossing the intervening hills east the next section will reach the Chakut river and follow its direction down generally by Bozanti and beyond to a point south of the "Earth bridge," already described, when it will pass by tunnel to the south side of the Taurus. Here will be a loop or bend west, and again back east, in order to bring the line to the plain level by a gentle incline along the contours of these hills. I use the future tense advisedly, being of opinion that this will be an accomplished fact in a

not very remote period. No insuperable engineering difficulty presents itself. The Chakut course is selected, and the line will not pass near the Cilician Gates, in order to avoid the rise from Bozanti at 2600 feet to the Tekir Col at 4250 feet, with a subsequent proportionately increased descent to Adana. The points to be considered in connection with this enterprise are political, commercial, and strategic. It is said that Turkey is very desirous that it should be carried through, and Germany appears to be so equally. These are powerful factors towards its success. The total cost is estimated at from twenty to twenty-five millions, a large amount but one which need not necessarily be found in one sum. If we do not join in the enterprise the line will be probably constructed by degrees in comparatively easily-financed sections. It is hardly necessary to dwell here upon the self-apparent political as well as commercial interest to be derived, from such a railway traversing all this country, by a foreign power engaged in its construction and management.

The argument that it cannot pay is often brought forward as a reason for holding aloof from the scheme. This argument is really one in which Turkey alone is financially interested as she would, by the kilometric guarantee system, be obliged to secure the payment of a fixed rate of interest from other funds to the bondholders. It is also sometimes said that the railway cannot be a commercial enterprise and that no other line in the country pays. If we look at this matter from a Turkish commercial standpoint we see that the Anatolian railway pays enormously. All around it to Angora as well as to Konia prices of cereals have increased considerably in value as well as in the quantity produced, a measure of wheat having jumped from 20 or 25 to 60 and 70 piastres. Nor should we lose sight of a strong humanitarian argument in the greatly increased prosperity, wealth, and happiness of the population. The camel and pack-horse traffic plying before to the coast now feeds the railway from the interior. The Angora kilometric guarantee fund, being no longer required there, has been transferred to the Konia-Eregli section.

The Eregli-Adana section will hardly come under paying conditions at first as the Adana-Mersina railway carries to the coast, but as soon as the main line passes to the east, beyond, and down through Mesopotamia, the advantage to Turkey will be enormous as well as to universal trade. All those parts, now necessarily a nomad-traversed grazing country because no means of profitable transport exist, will, with the advent of the railway, and of irrigation later, become one of the finest cotton and grain producing parts of the world. It must not be said, therefore, that this line cannot pay or prove to be of commercial advantage. Nor should it in any way clash with our own already-established trade interests, our great lines transferring some of their ships to the gulf, our river steamers from Bagdad to the sea reaping

the advantages of increased production, commerce, and local wealth, and competing easily with the railway in freights. We need not enter here into the strategic advantages to Turkey to be derived from this line. The questions to ask are, can this railway be made without our participation; and if we participate, can we obtain the conditions and guarantees of every description which we may feel bound to demand? I have no doubt that, when the proper moment comes, the affirmative to the second will render the first question superfluous, and if this civilizing and beneficial undertaking, the railway to the Persian gulf, be ever an accomplished fact it will be so with the full measure of Great Britain's participation and goodwill.

Before the paper, the PRESIDENT said: I now introduce to you Colonel Massy, who, after having served his country as an officer, has been for the last nine years in the consular service, seven of which have been passed in Asiatic Turkey, about which he is going to speak to us. But those seven years were not spent in a consular office. They were employed in going about the country doing very valuable consular work, and at the same time very valuable geographical work. Colonel Massy, having been a long resident and traveller in those districts, has had very marked advantages over the ordinary traveller or explorer who passes through a region. In the first place, he was familiar with the language of the country; I understand that he talks Turkish like a native, and he also has some acquaintance with native dialects and other tongues on the borders. But even more than that, Colonel Massy, from living there and travelling there, has long ago become acquainted with the idiosyncrasies of the various tribes and peoples who inhabit those regions, so that he is and has been in an exceptional position for acquiring information both rapidly and accurately. Any one knows, of course, who goes for the first time to a new country—it is astonishing how little Asia Minor has been travelled over—the difficulties met with from want of knowledge of the language or from friction with the people. Colonel Massy has had none of those difficulties. We welcome him as a representative of that great consular service which in various parts of the world has done such admirable geographical work. I call upon him to read his paper.

After the paper, the PRESIDENT said: I noticed that Colonel Massy referred in the course of his paper to Sir Charles Wilson, who I think is one of the oldest Fellows of this Society who has travelled in Asia Minor and written on it. I am afraid he is not here to-night. As we cannot get the oldest of our travellers we will get one of the youngest, and I venture to call on the Earl of Ronaldshay.

The EARL OF RONALDSHAY: I should like, if I might venture to do so, to congratulate Colonel Massy on the very interesting and important paper he has read to us this evening. I think it is a paper which has been listened to with interest and attention by everybody here present, and it is certainly a paper of especial interest to myself in that it has gone a very long way in filling up the many blanks necessarily left in a picture formed from a merely cursory personal inspection of some parts of the country which he has so admirably described. I should like to say I fully support what Colonel Massy has said with regard to the maps of the country. I only hope that the vast knowledge and experience he must have acquired in the seven years he spent in that country will be devoted in the future to correcting, improving, and bringing up to date the maps that are already in existence. I think you will agree with me that it is to men like Colonel Massy,

who are in a position to make a long residence and carry out extensive journeys in such countries, that we must turn to get accurate geographical information. I know only too well the difficulties which confront the casual traveller in determining, for instance, geographical names from mere verbal information which he may receive in the country. The casual traveller, unlike men who reside in the country, is probably not very well acquainted with the language of the people among whom he is moving. I think Colonel Massy will probably tell you that geographical names are for the most part based upon everyday objects. In some parts of Asia that is a system which is given an even further extension. I have come across instances among the Kirgiz in Central Asia where they carry the custom so far that the object which is first seen by the mother after she has given birth to a child is very frequently responsible for the name of the child. That is a custom which we can understand is apt to be of very considerable inconvenience to the aforesaid children. I remember myself, when travelling in Central Asia, coming across a Kirgiz man whose mother had the misfortune to see three old ladies at the door of her tent shortly after she had given birth to her son, and "three old women," or what is the equivalent to "three old women" in the Kirgiz vernacular, was the name that man was destined to carry to his grave. That is only one of the many difficulties which surround the casual traveller, which, I think you will agree with me, melt and disappear before the knowledge and experience of men like Colonel Massy, who have had the opportunity of long residence in the country. Now, sir, I am bound to admit that it is Eastern politics and Eastern diplomacy and Eastern intrigue which have formed the magnet that has been chiefly instrumental in drawing me to visit the more uncivilized countries of Asia, and I am not going to say many words lest I should run the risk of being ruled out of order in travelling from the domains of geography into the realms of politics. There is one border, however, where they may be said to meet, and which can be described as common ground to both these sciences, and I would venture to say one word which should touch upon these zones. I think it has been said by Colonel Massy that travel and exploration act as an incentive to the historical study of the region traversed. I think he might have said with equal truth that travel over and exploration in those countries, which slowly but surely, willingly or unwillingly, are being forced into the vortex of world-movement, throw a very much-needed light upon the probable or possible direction of the advance of powerful and expanding neighbours. If I might give you an instance of what I mean, I might quote the case of eastern Persia. It is essential that those who are responsible for the defence of our Indian Empire should know whether the physical conformation of Khurasan will invite or admit of the building of railways from north to south along the western frontier of Afghanistan. Speaking personally from my own experience, I am inclined to agree with the conclusions of Sir Thomas Holdich that they will not do so, but whether that be so or not is perhaps beside the point in the discussion this evening. The point is that a satisfactory conclusion can only be arrived at from accurate knowledge of the physical geography of the country, and in that connection I think Colonel Massy has raised a very interesting point in the remarks he has let fall with regard to the future construction of railways across the Taurus mountains. Now, I have travelled on the Taurus mountains in mid-winter, and I might say incidentally, that my experience is in entire accordance with the conclusions Colonel Massy has come to with regard to nomad life in that country; that is to say, genuine nomads are practically non-existent, and the tent-dwellers retire during the severe winter to the more substantial abode of the permanent villages in the plains. Now as to the railway itself, we have

been told on the authority of no less an expert than Prof. Ramsay, that for the first 30 or 40 miles from the time that railway passes into the range of the Taurus mountains no engineering difficulty whatsoever would be met with. The railway for the first 30 or 40 miles beyond its present terminus will only meet with a continual and easy descent through an easily traversed valley. But beyond this point, beyond a little place which I think Colonel Massy described as Bozanti, the railway, instead of following the usual route through the Cilician Gates, will be carried along the course of the Chakid Su, and it is as to the nature of that piece of country that I should like, if I could, to obtain some rather more detailed information, for it is here that the one great obstacle which the railway will be confronted with will be met. We have it once more on the authority of Prof. Ramsay that the glen at this point comes to an end before what he describes as a wall of nearly 2000 feet in height, with hardly any room for curves, and I was told by an engineer in charge of the railway construction at Konia that something like seventy tunnels would be required before it could be carried to the Cilician plain. Seeing that Colonel Massy has expressed an opinion that that railway will be built in the near future, I should very much like, if it were possible, to extract from him or from anybody else who may be present some rather more detailed information as to the difficulties with which the engineers will be confronted in the course of that section. I certainly hold the opinion that sooner or later the people of this country will be approached with a view to securing the co-operation of this country in the enterprise which is known as the Bagdad railway scheme, and I do hold that, when the time comes, the men who are called upon to deal with that situation should be in possession of as complete a knowledge as possible, from a political, a commercial, and a financial aspect, and from the one which interests us this evening, from a geographical point of view. Now, sir, it is in order that I might have the pleasure of congratulating Colonel Massy on the very interesting paper which he has been good enough to give us this evening, and also that I might, if possible, extract a little further detailed information either from him or from any one else who has travelled over the country that I have ventured to enter upon your discussion with these few brief remarks.

The PRESIDENT: I understand there is a lady present, Miss Jebb, who has travelled over the line; if she is here, I hope she will honour us with a few observations.

Miss JEBB: I have been asked by Colonel Massy to say a few words to-night because I happen to have travelled on the particular line which the Bagdad railway is supposed to be going to follow, but I must apologize for not having any qualifications to speak before the members of the Royal Geographical Society, and I have nothing at all profound to say. I would like to say that I am glad of this opportunity to make it known how Colonel Massy fulfilled one of the functions of a vice-consul in a way which I would like to see others follow—that is to say, he encourages travellers. If it had not been for Colonel Massy, I think it is quite certain that neither I nor my companion would have had the opportunity of travelling where we did.

One point Colonel Massy mentioned about his experience in the Taurus I would just like to comment on. I also have travelled in the Taurus mountains in winter, and I can endorse what has been said with regard to there being no nomadic tribes. I met with no nomadic tribes. But there is one remark of Colonel Massy's I cannot endorse—he says the roads through the Cilician Gates were excellent a few years ago, and good for carriages. I can only suppose he has lived so long in a country where the standard of roads is not good, that his

standard is lower than mine. I also passed through the Cilician Gates, and it was in a pouring rain and very heavy mist, and I can certainly say that the road would be as easy to drive a carriage over as perhaps the chairs occupying this room. We travelled from Konia, the terminus of the Anatolian railway, to Olu-Kishlu, and from there, instead of going by the usual route on to Bozanti, we struck across the Taurus mountains and came over a pass just above Bulghar Maden. I happen to have an altitude there, and I mention it because it rather illustrates what Colonel Massy has said about the range of the Taurus being underestimated. Where we passed over the range it was 5800 feet, and we seemed hardly to have got any way to the top of the towering masses above us, so that I should certainly think that 6000 feet is a great deal too low to fix as the average height of the range. There is another thing, referring to the question of the Bagdad railway—we followed the course of the larger towns to the north, which I believe the railway will miss. It has often struck me what a great agricultural opening there would be if the line followed this course. Between Urfa and Birejik on the Euphrates, it struck me as an agriculturalist that the soil was tremendously fertile, and a great deal of it was under cultivation; there did not seem any engineering difficulty in going straight to Urfa with a branch to Aleppo. Colonel Massy has alluded to the difficulties of maps, and I am sure any traveller in that country will endorse that. We were very much inconvenienced very often by the fact that the local people never seemed to have heard of any village about 10 miles distant from themselves, and if they had heard of it, it generally had four or five different names from that marked on the map. We were told that it was particularly unsafe for two women to travel alone in Turkey. I can only say that I do not suppose I have ever been so well treated, or so well looked after, or so courteously received as during the seven months when my friend and I travelled alone in Asia Minor. We had opportunities which perhaps even Colonel Massy did not have, for we were able to go into the harems and see a good many of the women, and in that way I think we saw one side of Turkish life which certainly men travellers do not get to see at all. It is, of course, no use dilating on the difficulties of travel in that country, because if we did, I think people in this country would think we were drawing a long bow.

Sir CLEMENTS MARKHAM: I have very little right to join in this discussion and there is very little time to do it in. My personal knowledge of Asia Minor is entirely confined to one spot, though that is a very interesting spot, on the eastern coast; but Asia Minor has long been interesting to all geographers, because from the fifteenth century it has been, geographically speaking, until quite recently an almost unknown country. It has been one of our *Terræ Reclusæ* like the central part of Africa fifty years ago, and yet in Asia Minor the most interesting historical events have taken place. I think we must all at some time or other have been entranced by the thought of those ten thousand Greek explorers marching along the whole length of Asia Minor with such an accomplished geographer for their guide as Xenophon. But our geographical forefathers were quite unable to follow him, on account of their total geographical ignorance of Asia Minor. Major Rennell, the greatest of English geographers, attempted to do so, but he had nothing to help him but the inaccurate map of D'Anville; which, among other things, was one degree out in latitude, therefore many of his remarks are now valueless. But I would, in a few words, wish to remind the Fellows of this Society how much we have tried during our whole history to further the exploration of Asia Minor. In our very beginnings, when we were very poor, we contributed close upon two thousand pounds to aid Mr. Ainsworth's Kurdistan expedition. The labours of our former President, Mr. Hamilton, the more voluminous labours of our

Vice-President, Colonel Leek, were the forerunners of very splendid work which has been accomplished in more recent times, and this Society has done all it could to help and encourage exploration by subscribing to the Exploration Fund, by bringing out that valuable work of Prof. Ramsay's, 'The Historical Geography of Asia Minor,' and by lending our instruments to many travellers in the country. But still, until we received the results of these explorations we were in great ignorance of Asia Minor. But we must now feel what a good return we have had, consisting of the labours of such men as Ramsay and Wilson, and Myres and Hogarth; and another result has been the valuable map of Colonel Maunsel, and still another the excellent paper we have just listened to from Colonel Massy. I think we must all have been impressed by this fact, that there can be no intelligent knowledge of history without the help of geography, and for that reason I think that the work that has been done by this Society to encourage exploration in Asia Minor is work of which we may be proud, and I trust we shall be able to continue to do so on every possible opportunity.

The PRESIDENT: The hour is now so late that I am afraid we have no time to call upon other speakers. I will simply propose a hearty vote of thanks to Colonel Massy for his excellent paper.

Colonel MASSY: I should just like to answer Lord Ronaldshay. Everything is a matter of comparison, and when one travels over some of those almost tractless mountains, he will find his ideas of a road somewhat changed. These roads you could pass on wheels. As to the railway, I do not think there will be very many tunnels at all. I happened to stop in that country for over a week with the engineers when they were considering the routes by which it would be best to reach the Chakut river. Then it would reach the Taurus, and then it would pass through one single tunnel, and that would be a very long one; but having passed out of that, the railway would take a bend to the south, and then it would bend to the west, gradually going to the side of the cliff. The whole height is not great, and then there would be the tunnel; that would bring it to about 800 feet, and then, bending round the loop, it would reach the plain. I don't think I have anything further to say, except to thank you for the great patience you have shown in listening to my paper.

A JOURNEY AMONG THE HIGHLANDS OF CHILI.*

By E. C. YOUNG.

THE following lines describe the writer's experiences during an autumn journey in North China, in the province of Chili. The greater part of the province of Chili, it should be explained, is a vast alluvial plain which stretches northwards from the Gulf of Chili to the mountainous region which separates it from Shansi and Mongolia, and it was in this latter district that the journey was made in the autumn of 1904. The chief object of the expedition was to explore a little-known and unsurveyed district to the north of Cho Chau, a large provincial town on the Franco-Belgian railway between Pekin and Pao-ting Fu. A route survey was to be made for the benefit of the British Intelligence Branch of the North China command, and much kind assistance was

* Map, p. 368.

received from Colonel Wingate, the head of the department, who moreover despatched an Indian surveyor, Abbaz Khan by name, to assist in the survey. A secondary but also important part of the scheme of operations was to trace as much as possible of the course of a river called the Chu-ma Ho, which as yet had only been partially surveyed. My party consisted of seven members besides myself, viz. Abbaz Khan, my "boy" or body-servant, a Chinese Mohammedan to cook and "do" for the Indian, three survey coolies, and, last but not least, an English sheep-dog of mine called "Shep."

The first day's march from Cho Chau was over a level plain which stretched almost to the foot of the hills, and it was not until well on in the afternoon that the ground began to rise; the road now became rougher and rougher, and was sunk below the level of the ground, in some cases to a depth of 15 feet. Leaving the main road, we struck across country, and by dusk reached the tiny hamlet of San-tsaw-an, nestling in a valley formed by the spurs of a prominent mountain which was our objective.

The following morning broke fine, and, after an early breakfast, arrangements were made for the ascent of the mountain (Peak No. 23, as it was called), a "fixed point" on the maps of the Intelligence Department, from which, being 3500 feet high, it was hoped that a useful reconnaissance of the country before us might be made, whilst possibly a glimpse of the Wu-tai Shan—a mountain of some 9000 feet, situated in the direction of our route—might be obtained. Peak No. 23 was an innocent-looking mountain, resembling in shape the half of a sugar-loaf, and in the clear morning air it looked so close and easy of ascent that we gaily contemplated returning by lunch-time. No provisions were carried, therefore, and those of the party who were not selected for the ascent were ordered to remain in camp and stand by to pack the mules and strike tents as soon as they saw us returning. The path was a mere goat-track, which, leading over a low pass, dipped down into the valley which lay immediately at the foot of the peak. Here we engaged a guide from some peasants working in the fields, and after about a mile began to ascend, and were soon zigzagging our way up the side of a rugged and precipitous slope, where, at a short distance, the path was quite invisible, and where a stumble would have sent one ricochetting into the valley beneath with long odds in favour of a broken neck. Higher and higher we climbed, till one's legs almost refused to surmount the rocky steps and boulders over which the track continued. After about an hour of this, we reached the crest of one of the spurs of the mountain, where the track ran at a reasonable gradient for some distance. Pursuing our course, we found that the eastern slopes of the mountain were considerably less steep than those on the west where we had ascended, and we were agreeably surprised to find that cultivation was continued

about two-thirds of the way up to the top of the peak, suggesting that there must be water at hand somewhere. Presently, to our delight, we came on some pear trees heavy with beautiful yellow fruit; and in the twinkling of an eye the coolies were in the branches shaking down scores of luscious fruit, which we fell on literally tooth and nail. They were delicious, and in our somewhat ravenous condition their flavour was as nectar. A little further on we came to a few houses nestling right under the peak, where a rivulet of clear cold water was trickling down the mountain-side. We now thought ourselves within easy reach of the summit, but another hour's hard climbing up the steep sides of the cone was required before we at length reached the top, by which time it was almost noon. The day was fine, and, though not as clear as might have been wished, there were magnificent views displayed on all sides. No. 23 was a real peak, and, the summit being only a few feet in circumference, the landscape was laid out before us on all sides like a map. To southward the wide plain of Chili stretched to the horizon like some dull green sea, the numerous villages and towns showing as mere patches of brown on its surface, whilst the course of the Chu-ma Ho could be distinctly traced from Cho Chau to the point where it emerged from the hills. It was to northward, however, that our eyes were turned; and here the resemblance to the sea was also maintained, though in this case it was a stormy sea whose waves were rugged, jagged mountain-tops which continued in endless ranges as far as the eye could reach. Nothing in the nature of open ground could be discerned, but peak beyond peak and range beyond range in unbroken succession, whilst no signs of inhabitants or cultivation were visible. The hills were barren and rocky for the most part, but on some a scanty covering of grass or stunted scrub coloured them a dull green, which, further and further towards the horizon, the haze of distance changed gradually into purple and light blue. Amid such a countless multitude of lofty hills, it was impossible to select any one as being the Waw-tai-shan, and we had to content ourselves with making a rough sketch of the general features of the surrounding country and taking sights with the theodolite to a few of the most prominent peaks which seemed to lie in the direction of our route. This done, it was high time to descend, for we were all shivering in the chilly blast, and, moreover, it was now 2 p.m., and we had no wish to make any part of the descent in the dark. The descent was a slow and rather wearisome job, as we were stiff and tired, and it took nearly as long to come down as it had to go up, so that it was after five when we eventually reached the camp. The net result of our labour was rather disappointing, as, although we had had a fine view, yet no particular advantage had been gained, whilst we were all more or less footsore and tired out by the stiffness of the climb.

Next day our march lay across the low grass-covered foothills

which separated the real mountains from the plains, and by evening we reached the small town of Chang-fang, which, though shown on our maps as being some 10 miles to the west of the Chu-ma Ho, was found by us to be actually about a mile to the east of that river. We found an inn there, the last we were destined to meet with till the completion of our journey.

Chang-fang marked the limit of explored country in this direction, and it was with a pleasing feeling of expectancy that we set out next day. A few miles north of Chang-fang the river Chu-ma Ho emerges from the mountains, and a short walk brought us to the water's edge. The river at this point was some 100 yards wide and from 3 to 5 feet deep, without bridge or other means of crossing. After much delay and useless jabbering, a guide was secured who piloted us over a ford some 400 yards down-stream.

Although the frequent fords made us look on the Chu-ma Ho with some aversion, the river was a beautiful sight, dashing and rippling over its rocky bed, its water as clear as crystal, its banks hedged with perpendicular cliffs and lofty hills which were clothed in short green brushwood which autumn was already streaking with purple and gold. Animal-life was conspicuously absent, and the lonely character of the gorges was but accentuated by the dull roar of the river as it forced its way over its rocky bed hushing all other sounds, and making it surprisingly difficult to call to one another at any distance. Our road was a mere track, which, sometimes hugging the foot of the hills and sometimes losing itself in the boulder-strewn shingle of the river-bed, was always rough and impracticable for any kind of transport except the sure-footed mules and donkeys which were always to be found at every village. Occasionally we saw flocks of goats browsing on the steep mountain-sides, and the ubiquitous Chinese pig—black, hairy, and dirty, as usual—was always to be seen in the villages, as were also a few cows and oxen used for ploughing the patches of land which the thrifty peasantry contrived to cultivate wherever the soil was sufficiently free from rock. Apart from the villages, however, there was a singular absence of living creatures, either feathered or furred, and although the brushwood must assuredly have held game, we saw no sign of it, though the natives told us that deer and even wolves were to be found in the hills. The roughness of the track, and the frequent delays caused by the numerous fords, made slow progress the rule, and we only averaged some 10 miles a day on this part of the route. The first night out from Chang-fang we camped at a hamlet called Liu-tu-ling, a picturesquely situated cluster of houses surrounded by orchards of Persimmon trees, whose large yellow fruit looked like luscious oranges.

The following day we continued to hug the river, with its usual succession of fords, until reaching the village of Hsi-munn-ling, where we were told we must take a roundabout route through the hills, as

the river was too deep to be forded. The road now entered a sombre ravine between steep and lofty hills, which, shutting out the rays of the afternoon sun, made it as dark as though it were actually dusk. Of habitations there were none, and the intense stillness and dank vegetable smell reminded me strongly of the dense jungles of Assam where the sunshine never penetrates. An hour's march brought us to the foot of a rocky slope, which, rising at an abrupt angle to a height of some 1800 feet, was dignified with the name of a pass. Surveying over ground of this type is not easy, and our progress was very slow, whilst halfway up the pass we took a wrong turn, which landed us in a *cul-de-sac* at the foot of a precipice, from which we had to retrace

GORGES ON THE CHU-MA HO, WITH NATIVE BRIDGE.

our steps; so that it was not till 5 p.m. that I reached the summit, where, according to the kindly Chinese custom, there was a little temple built for the use of travellers. Doubtless the idea is a pagan one—the Buddhist shrine testifies to this—but in practice the temples, which are nearly always found at the top of all important passes, must often be of real benefit to wayfarers, especially in winter, when the shelter thus afforded would enable the traveller to light a fire and make some defence against the bitter cold of North China. I have no doubt that many a poor Chinaman has offered up a genuine prayer of thanksgiving on reaching one of these mountain shrines.

The following day was cold and windy, and our route again followed the course of the river with its usual succession of fords. We crossed

two bridges, ingenious structures composed of rough logs laid across piers built of basketwork cribs filled with stones, the roadway being made of stout wattled willow mat. The fords were particularly deep and numerous on this part of the river, and we were wetted and chilled continually in the cold wind, so that we ought to have "caught our deaths of cold;" but none of the party suffered in any degree from the constant wettings they experienced. Our troubles with the fords were nearly at an end, however, for by four o'clock we reached the junction of the Chu-ma Ho with its most important tributary, up whose bank we were told our road lay. The main river here makes a bold curve to the south-west, and disappears between frowning hillsides as though plunging into the "bowels of the earth," the sudden hushing of its ceaseless murmur resembling the stillness following on the disappearance of a train into a railway tunnel. The tributary was a mere mountain stream, at this season merely a foot or two in depth, meandering through a stony valley about half a mile wide, which, judging from the water-worn shingle with which it was strewn, serves as a channel for the overflow of the stream after rain. By dusk we had reached Se-shih-ko, a rather larger village than those we had hitherto met with, where they boasted that they once *had* had an inn, but that for want of custom it was now occupied by the residents of the place.

At Se-shih-ko we made a very late start, as our mules and their drivers had gone away somewhere, and did not turn up till nearly ten o'clock. Meanwhile, the result of repeated inquiries showed that the tributary stream whose course we were pursuing would take us too far to the north-east, thus diverting us from the unexplored regions we wished to traverse. I therefore decided to leave the stream and take a hill road to the south-west, hoping in this way to strike some feasible route leading in the desired direction. Accordingly we commenced climbing the hills soon after leaving Se-shih-ko, and, after a long gradual ascent, reached the top of the Tan-tze-ling pass by about 4 p.m. Here again it was our luck to get separated from the baggage party, and by the time we reached the foot of the pass darkness was upon us, and the survey had to be stopped. I decided to halt here for a day. It was, unfortunately, foggy and damp the next day, so that no astronomical observations were possible, and photography was also of dubious value, and the greater part of the day was therefore devoted to "plotting" our work and overhauling our gear. A reconnoitre of the position showed that we had again joined the main stream of the Chu-ma Ho, whilst inquiries led me to believe that I had at last hit on the direct route into the unexplored track beyond the Great Wall for which I had been searching. Having already surveyed so large a portion of the Chu-ma Ho, I was loth to leave it altogether, whilst it was by this time quite evident that the time at my disposal would not admit of as long an excursion beyond the Great Wall as I had originally

intended; I therefore determined to divide my forces, and despatch Abbaz Khan to make a leisurely survey along the main river, whilst I, with the picked men of the party, made a rapid journey to the Great Wall, and as far as possible outside it, returning by the best route I could find to rejoin the Indian at Pan-chüng, a place apparently of some importance, to which it seemed I should be certain to find a road. The next day, therefore, I divided the party, and sending the "policeman" and two other men with Abbaz Khan, and taking only the "boy," the "volunteer," and the best of the survey coolies with me, I started *en route* for the Great Wall.

It was a dripping foggy morning as we left Peng-taw, and I was struck with the strong resemblance that the country hereabouts bore to the uplands which border on Dartmoor. The frowning cliffs and towering mountains which hitherto had hedged our route had now given place to rolling hills of more modest height, whilst the grass-covered valley, with its low stone walls and browsing sheep, looked very homelike viewed through the morning mist. Our road, as usual, followed the course of a mountain stream, a minor tributary of the main river; but the going was better than we had experienced since entering the mountains, and we made fair progress. We ascended gradually throughout the day, and this had the effect of dwarfing the hills to some extent, whilst the country was undoubtedly more open than that we had hitherto been travelling in. Late in the afternoon we sighted a stone tower in the distance, which we decided must be on the Great Wall, and before long we saw the wall itself climbing the hills to right and left of our route. A short pull and a strong pull brought us to the top of the pass and to a gate in the Great Wall, where the aneroids showed us to be 3000 feet above the sea—the highest point we had yet reached, with the exception of Peak No. 23.

It would be easy to write a glowing description of the Great Wall of China, and, indeed, one could find plenty such already printed in the various books describing this world-famed structure, but truth compels me to state that, though striking and interesting in its way, it did not inspire that open-mouthed admiration that one might have expected. The "Wan-li-chang-chüng" (or ten thousand "li" wall) is at this point about 20 feet in height by, say, an equal width (I did not take any actual measurements), and is of earth faced with masonry; it is flanked by numerous square "cavaliers," or watch towers, from whose crenelated battlements the Chinese braves in olden times doubtless kept watch and ward against the barbarians of the north. The wall is in fairly good preservation at this point, and as far as one could see it stretched in an unbroken line to east and west. Its most striking characteristic, perhaps, is the relentless manner in which it pursues its way up hill and down valley, over crag and mountain crest, undeterred by rock or fell, here spanning a mountain torrent, and there

apparently vanishing into the clouds as it became hid in the mist-covered mountain-top; it seemed as though those old Chinese builders must have simply revelled in overcoming the difficulties which Nature placed in their way, and one could not but speculate on the manner in which this gigantic undertaking had been carried out.

Evening was drawing on as we descended the pass and entered the village of Ma-tsui, a place which derives its importance from its being the headquarters of the mandarin in charge of the gate in the Great Wall through which passes the main route between the two important provincial towns of I Chau and Hsuen-hwa Fu. There is quite a large yamen here, and though the mandarin was away at Hsuen-hwa Fu, his subordinate very politely provided us with rooms in the yamen, and we exchanged calls and were on excellent terms. There is a break in the chain of mountains at this point, and a picturesque jumble of hills flanks the road, making Ma-tsui a place of considerable strategic value. The wall appears to split in two here and encircle the village and its environs, for towers and walls met us at every turn, and there were at least three gates at different quarters of the compass. A particularly striking view was afforded by a temple perched on the top of a low conical hill, its walls being coloured a bright pink, which, contrasting with the dark indigo foliage of the fir trees that clustered round, and the light green of the grassy hillside, made a bright and characteristically Eastern picture. I was up early the next morning, and bribed a sleepy and tousled Chinaman to accompany me up one of the more accessible hills to a tower on the wall, whence a magnificent view of the country before us was obtained; range beyond range of hills stretched before and beneath us, and one could clearly trace the course of a river, which, I was assured, was the only practicable route in the direction in which we wished to go. A careful reconnaissance with the field-glasses corroborated this opinion, and I was able to get a good idea of the route we were to follow, though I was disappointed to find that the eternal ranges of hills effectually prevented any view of the Wu-tai-shan mountains, which I had hoped would be visible from here. It was a perfect morning, and the scenery was delightfully varied and picturesque; numerous mule caravans were coming up the pass, laden with charcoal and cloth and other merchandise, each mule with a basket-work muzzle on his nose, which was usually decorated with a gaudy crimson rosette, whilst the leading animal carried a deep-toned bell, from which proceeded a hoarse but melodious jangle as the plucky little beast stepped lightly over the rocky path. Starting early, a few miles brought us to the river I had espied from the wall that morning, and inquiries proved that it was identical with the tributary whose course we had followed to Se-shih-ko, so that we had gained but little by our flank march to Peng-taw. Our road now turned north-west, which was the direction I was anxious to pursue, and, keeping parallel with the

river, crossed a fine park-like stretch of ground dotted with walnut trees and orchards of pear and date trees. A brief halt for lunch was made in a shady clump of trees adjoining the track, and then, pushing on for a mile or so further, we entered a narrow defile between steep and frowning hills, where our troubles began. The going soon became atrocious, and for the most part the track was indistinguishable from the stream, sometimes running up one bank and sometimes the other, and more often than not meandering in the bed of the stream itself. Huge boulders and shingle paved the way. For 5 stony miles we dragged our weary shins through this pitiless defile until, just before dark, we reached Ta Miao, a tiny village which was destined to mark the limit of our progress northwards. The people here were kindly disposed ragamuffins, who stated that we were the first foreigners they

MOUNTAINS NEAR THE GREAT WALL, WITH WHITE ROCK AND VILLAGE OF NANG-SHI-KO IN FOREGROUND.

had ever seen—a statement which they corroborated by the inordinate curiosity they displayed, men, women, and children all crowding round the camp and watching my smallest movement with the deepest interest. Like the inhabitants of all the villages we had passed through since entering the mountains, they seemed extremely poor and ignorant, whilst there were an extraordinary number of persons suffering from goitre; I estimated the proportion of those afflicted with this disease at about 20 per cent., and I fancy that is a moderate estimate. Their clothes were of the poorest description and often in rags, and in many cases they hardly knew the value of the dollar and its subdivisions which are current throughout the Treaty Ports and their surrounding districts. The villagers seemed so anxious to oblige us, that we did not grudge them the harmless but rather irritating amusement of gazing on us at every possible opportunity.

But it was now time to count up the days remaining for the return journey, and to decide on our next move. As I was already in some danger of overstaying my leave, I decided to turn back and make with all haste for the nearest point on the railway, which it seemed was near I Chau. This settled, I engaged mules, and we returned as quickly as possible over the road we had already surveyed until we reached a point some 3 miles inside the Great Wall, where the road diverged from our former route, and where it was accordingly necessary to again take up the survey.

The character of the country had now begun to change; the valleys were broader and the hills lower, with the result that cultivation was more general and the roads far easier, and the next day we made capital progress during the forenoon. At mid-day, however, we again struck one of the tributaries of the Chu-ma Ho, and following this on its southward course, the going became so shingly and rough that even such hardened pedestrians as we were were reduced to a slow and wearisome crawl. At night we camped at the village of Yu-taw-tsun, and on resuming our march next day we soon found that the going improved rapidly, and that in fact we were now entering a far less sterile district than we had hitherto met with. By 10 a.m. we rejoined the main stream of the Chu-ma Ho, which had now lost its wild and dashing character, and was a broad but shallow river only a foot or two in depth, so that there was no difficulty in crossing it. A few miles beyond the river we reached Pan Chŭng where Abbaz Khan's party were awaiting us, and after a brief halt we all travelled on together. The Chinese were in capital spirits at the thought that the hard marches were now nearly over, and that they were soon to be back in the land of pork and rice, and, the road being smooth and level, we made good progress and reached Ling-tze-nan by nightfall.

Our march from Ta Miao had been so rapid that we were now said to be only some 18 miles from Liang-kaw-chuang, the nearest point on the railway, and I had some hopes of getting there next day. Hitherto we had been following the main caravan route from Ma-tsui to I Chau, but we now left it, partly in order to avoid a high pass we were told of, and partly because I wanted to stick to the river as long as possible for the sake of the survey. Foot passengers and traffic apparently preferred the shorter route, and our road was therefore deserted and solitary. A few miles further and we bade a final farewell to the Chu-ma Ho, whose course we had followed so long, and with whose clear cold waters we had such an intimate and personal acquaintance; and after crossing some low hills we entered a beautiful woodland glen where oak and birch and other familiar trees gave a peculiarly homelike aspect to the scenery; the autumn tints were on the leaves, and after the rugged mountain scenery we were used to, the easy slopes covered with shady graceful trees were a delightful

change. The "close" nature of the country was not, however, favourable to rapid surveying, and it was not till 4 p.m. that we finally cleared the woods and found ourselves in a narrow valley between low rolling grass-covered hills. There were no signs of cultivation, and, with the exception of a few solitary huts at intervals of a mile or so, the place was uninhabited, whilst long grass that reached to our knees stretched before and around us as far as the eye could see. It was a curious and very unusual type of scenery for this part of China, where the plains are usually dusty and cultivated on every square inch; but the mystery was afterwards explained when we found that we were approaching the ancestral tombs of the emperors of China, and that these solitary grass-covered valleys formed part of the "Chin-ti" (or forbidden ground), which is reserved as a sort of "buffer state" to protect the tombs from the evil spirits of wind and water which are popularly supposed to come from the north. No one is allowed to settle or to cultivate land in this area, and the huts we saw were those of the watchmen appointed to guard these preserves. I was surprised to find that no objection was raised to our passing through, but apparently the road is free to all, and indeed the next day we met crowds of coolies going to cut grass, so that presumably the reservation is not a very strict affair. We pushed on as rapidly as possible, but by dusk there was still no sign of any village to be seen, and we were therefore obliged to camp for the night in company with the evil genii of the place, who, however, did not indulge in any special manifestations for our benefit. A short walk next morning brought us to the railway at Liang-kaw-chuang, and our journey was ended. The railway at this point is a small branch line especially constructed for the conveyance of the emperor and his suite to the imperial tombs on those occasions, usually every alternate year, when he goes to worship there. The solitary morning train had left before we arrived, and as we therefore had to wait till next day, we sought the hospitality of a large lama temple close at hand, where the lamas (for a consideration) gave us capital quarters and every attention.

The time was now come to return to Tien-tsin, and, in conclusion, it may not be out of place to glance briefly at the results of the expedition. The actual journey, from the time of our leaving the railway at Cho Chau to the day of our arrival at the western tombs, had taken just fourteen and a half days, during which time we had marched 150 miles, which, deducting the day spent in climbing Peak No. 23, which is not included in the mileage, and also allowing for the day's halt at Pong-taw, gives an average of about 12 miles a day. That we did not achieve a greater speed than this is due, firstly, to the fact that a route survey was kept up the whole way, and, secondly, to the extremely rough ground we traversed, and to the numerous fords, which occasioned a great deal of delay during the first half of the journey.

This comparatively slow progress and the short time at our disposal necessarily limited the scope of our operations, and, realizing this, we made a point of, at any rate, doing our work thoroughly as far as it went, and accordingly we tried to make the survey as connected and continuous as possible, an attempt in which we were so far successful that we were able to map the Chu-ma Ho pretty thoroughly the whole way from Chang-fang to where we left it near the western tombs, and as this happened to be an unexplored part of its course, our work was of some value. Its main tributaries were also explored to some extent, and surveyed with sufficient accuracy to enable a very fair idea to be obtained of the general system, and incidentally we obtained a traverse of the rather important trade route between I Chau and Ma-tsui. From the tourist's point of view the journey proved an unqualified success, for from first to last we travelled through picturesque mountain scenery of the most striking description, and the continual exercise, combined with the rough healthy open-air life, made us as hardy and "fit" as could be, so that, as I involuntarily remarked to Abbaz Khan on the day that we returned to Tien-tsin, we were fit to walk anywhere.

Finally, I must not fail to give a word of hearty acknowledgment of the services of my fellow-travellers. Abbaz Khan showed himself throughout an industrious and careful surveyor and an intelligent and reliable subordinate, whilst the Chinese members of the party distinguished themselves by their unfailing good humour and readiness to do whatever was wanted of them. They were always cheery and full of jokes and laughter, and throughout the journey it was very rarely that I had occasion to find fault with any of them. I have already spoken of the kindliness and civility of the villagers amongst whom we sojourned from time to time, and on the whole my experience during this autumn holiday gave me a strong impression of the good nature which is undoubtedly one of the leading characteristics of the Northern Chinese.

THE VOYAGE OF THE "NEPTUNE" IN NORTHERN CANADIAN WATERS.

We have received the report of the Department of Marine and Fisheries for 1904, containing the account by Mr. A. P. Low of the voyage of the Government steamer *Neptune* in 1903–4 to Hudson bay and the archipelago to the north of it, to which reference has already been made in the *Journal*. The account is only a preliminary one, and will be followed by a full report embodying all the results of the voyage, but enough is said to show the importance of the latter for a better knowledge of the lands and seas touched upon. The surveys, which were carried out wherever practicable, and extended in all to over 2000 miles of coast, have permitted many rectifications of the charts to be made, while Mr. Low's qualifications as a geologist render his observations on the nature of the formations met with of

special value. Other results are soundings, observations on the state of the ice at different times of the year, extensive natural history collections, and a regular series of meteorological observations, besides studies of the Eskimo tribes met with. The *Neptune*, which is one of the best steamers of the Newfoundland sealing fleet, was commanded by the experienced ice-navigator, Captain Bartlett, to whose skill Mr. Low bears willing tribute. One of the primary objects of the expedition was the enforcement of Canadian jurisdiction over these northern territories, an officer and detachment of N.W. Mounted Police being especially sent for this purpose.

The settlements on the shores of Cumberland gulf, in Baffin Land, were first visited, the ship's head being then turned southward along the south shore of the gulf *en route* for Hudson strait. The coast is there very bold and broken, with bare rocky cliffs rising from 500 to 1000 feet above the sea, and higher ground behind. The coast is deeply indented by long narrow fiords, and a boat-channel can be followed from Blacklead to Cape Haven station, behind a series of bold rocky islands. Rounding the south point of Resolution island, the *Neptune* followed the north shore of Hudson strait, passing close to the Saddleback islands, which were found to be double the number marked on the chart. The ship also passed over the doubtful Griper shoal, without any indication of its presence. Many icebergs, driven into the strait by the south-east winds, said to have prevailed all the summer, were seen. After touching at Erik cove, a good harbour just east of Cape Wolstenholme, a course was laid for Cape Fullerton, through Evans and Fisher straits, south of North Southampton island. Bell island, composed of granite and limestone, was the most desolate-looking country Mr. Low had ever seen. Heavy ice was encountered on its coast. Further on, the location of Tom island on the chart was passed without any indication of it from the soundings. It was decided to winter at Fullerton, where the *Era*, an American whaling schooner, was already in winter quarters. Meanwhile Mr. Low proceeded in the launch to Chesterfield inlet, to procure supplies from the Eskimo there. On the return journey the launch grounded and capsized, but news was fortunately conveyed to the ship by means of the dingy. The dangers of this uncharted coast are considerable, the *Neptune* grounding twice out of sight of land while on the way to fetch back the party. The harbour at Cape Fullerton froze over on October 16, and preparations were made, by building a wall of snow-blocks round the ship, to secure the comfort of the crew during the winter. In the spring exploring work was commenced. During April and May, Mr. Wager made a survey of the coast from Cape Fullerton to and around Wager inlet; Mr. King, assisted by Mr. Ross, made surveys of the harbour and approaches to Fullerton, taking many soundings through holes bored in the ice. In June, Mr. Low and Dr. Borden made a trip to Southampton island (of which formal possession was taken), examining about 50 miles of coast north of Cape Kendall. The ice was still solid on the coast, and, like much of the land, was covered with deep snow, rendering travelling next to impossible. During the winter the weather was quite severe at times, the average temperature in February being as low as $-27°{\cdot}8$, while the lowest minimum, which occurred in March, was $-53°$.

A start was finally made in the *Neptune* on July 18, and a course was laid for the south-west end of Southampton island (presumably the southern island of that name), which was found to be placed on the charts at least 40 miles too far south. The ship was once more beset during the passage through Hudson strait, but soon got free, and the voyage was continued up the coast of Greenland, and across Melville bay to Smith sound, a visit being paid to Peary's former headquarters at Etah. Crossing over to Ellesmere island, some heavy Arctic ice, which had

passed down through Kennedy channel, was encountered. Formal possession was taken of Ellesmere island, near the site of Peary's last headquarters, and again at Cape Herschell, on the return voyage southward, which was commenced without delay, heavy ice being again met with.

Mr. Low's report gives some interesting details as to the configuration and geological structure of the Arctic coasts hereabouts. From Cape Sabine to Cadogan bay (where the coast is very different from that laid down on the charts) the land is high and bold, and the shores deeply indented. The amount of ice and snow was much greater than on the Greenland side. Only prominent capes are partly bare, and inland there appears to be a continuous ice-cap, discharging many glaciers. Granite rocks extend south to Cape Isabella, where they are replaced by bedded sandstones, identical with those of Northern Greenland, though Mr. Low is inclined to think them older than the age assigned to the latter. At Cadogan bay these again give place to Laurentian granite, which, as the voyagers proceeded up Lancaster sound, was capped with horizontal beds of Silurian limestone, the country then becoming a flat tableland, with an abrupt, deeply cut, coast. Shelter was sought in one of the bays, the water being for 10 miles too deep to anchor, and the cliffs rising to a height of 1500 feet. The furthest west was at Erebus harbour, Beechy island, Franklin's winter quarters before passing westward on his last fatal voyage. Here the record left by Captain Amundsen, already referred to in the *Journal*, was found. No ice could be seen to the westward in Barrow strait, the prospects for a north-west passage appearing particularly favourable, though lack of instructions precluded the attempt.

At Beechy island a proclamation, taking formal possession of North Devon for the Dominion, was again read, and the *Neptune* was once more headed east, passing down the coast of Baffin Land, and visiting the quarters of the whalers and Eskimo at Pond's inlet and elsewhere. The latter describe the interior as less forbidding than would appear from the coast. Deposits, apparently of Tertiary age, and containing lignite, occur on this coast; and though there is probably no workable coal, Mr. Low considers it possible that alluvial gold may be associated in these deposits. Before finally sailing homewards it was necessary to once more visit Fullerton, in order to communicate with the police detachment left there; and the passage through Hudson strait gave an opportunity for carrying out further surveys. A sounding alongside of Salisbury island (which rises abruptly to perhaps 1000 feet) gave no bottom at 230 fathoms, this being the deepest water with the strait. Some Eskimo encampments were visited, and books distributed, some of the people having learnt to read from other natives, who in turn had been visited by native agents from the mission stations. The *Neptune* reached Halifax on October 11, 1904, after an absence of a year and fifty-one days.

REVIEWS.

EUROPE.

Ports of North-West Europe.

'Die nordwesteuropäischen Welthäfen.' Von Dr. Kurt Wiedenfeld, Privatdozent der Staatswissenschaften an der Universität Berlin. Berlin, 1903.

This volume owes much of its material to a journey undertaken by the author in the autumn of 1901 under the patronage of the Berlin *Institut für Meereskunde*. Its purpose is a detailed study of the commercial position and future prospects of London and Liverpool, Hamburg and Bremen, Amsterdam and Rotterdam,

Antwerp and Havre. Opening with a sketch of modern world-trade, by land and sea, before and after 1870 ("Die Organisation des Weltverkehrs in ihren Grundzügen," pp. 1–11), Dr. Wiedenfeld proceeds to consider the relations of the great harbours of North-Western Europe first to oceanic, and then to continental, commerce and intercourse, as well as to the general organization of modern trade ("Die Beziehungen zur Seeschiffahrt," pp. 12–267; "Die Handels-Organisation und die Beziehungen zum Hinterland," pp. 268–358). The text is followed by six plans—(1) of the Thames and Mersey estuaries; (2) of the mouths of the Weser Elbe, Seine, and Scheldt, and the communications of Amsterdam and Rotterdam with the ocean; (3–6) of the docks of London, Liverpool, Hamburg, Bremen, Cuxhaven, Bremerhaven, Geestemünde, Amsterdam, Rotterdam, Antwerp, and Havre. What is here illustrated by plans is described in the text with a thoroughness which leaves little or nothing to be desired. Dr. Wiedenfeld has done his work very well; he gives us here a detailed, but at the same time illuminating, account of the chief centres of modern oceanic commerce in North-Western Europe, and he studies with excellent result the general courses and conditions of that commerce so far as it is based upon these ports. The special connections of each centre—the special spheres of maritime trade-influence belonging respectively to London, Hamburg, Liverpool, and the rest—are carefully set forth; particular attention is given to the development of German commerce oversea; and the conclusion of a certain though very gradual decline in the *preponderance* of the British harbours is drawn with apparent fairness ("Nur Australasien kann heute als die fast unbestrittene Domäne des Londoner Verkehrs bezeichnet werden . . . London ist nicht mehr die Alleinherrscherin im Weltverkehr"). By the side of London and Liverpool, Hamburg, Antwerp, and Bremen have taken their place, and new developments of the highest import are being gradually prepared for in oceanic trade. C. R. B.

ASIA.

Eastern Colonial Methods.

'The Far Eastern Tropics. Studies in the Administration of Tropical Dependencies: Hongkong, British North Borneo, Sarawak, Burma, the Federated Malay States, the Straits Settlements, French Indo-China, Java, and the Philippine Islands.' By Alleyne Ireland, F.R.G.S. Westminster: Archibald Constable & Co. 1905. 8vo. Pp. 339. *Map.* 7*s.* 6*d. net.*

Mr. Alleyne Ireland, whose name is probably familiar to a good number of geographers as that of the author of 'Tropical Colonisation,' here presents us with a series of studies on colonial administration—the *avant coureur* of a much larger work on the same subject. Appointed by the University of Chicago in 1901 as a special commissioner for the purpose of visiting the various tropical colonies in Asia, and reporting on the systems of colonial administration, he has from time to time communicated articles dealing with these and allied matters to the *Times* newspaper. We cannot at the moment recall whether the volume under notice is an actual reprint of this series, or whether the latter merely served as the framework of the essays before us, but from the preface it would seem that some such amplification has been made. But, however it may be, no fault can be found with Mr. Ireland's resolve to put his views into more permanent form, for his subject is of unusual interest, and is one to which, hitherto, far too little attention has been paid.

The author—who, it should be stated, is a British subject, notwithstanding his American appointment—has, to begin with, a claim to a hearing if only on the score of his long and extensive investigations in the special field he has chosen;

but, as the reader soon discovers, this is by no means the sum of his qualifications for the discussing of the various systems he passes in review. Of these latter he gives a tolerably comprehensive selection, exhibiting a heterogeneity which is instructive to the student. We have, as may be seen on reference to the sub-title of the book, a small British Crown colony, which is, nevertheless, the largest port in the world, a merchant-company's venture in kingdom-keeping, a private white despotism, a province of India, a group of federated states administered "under the advice of a British Resident-General," a French experiment in Indian empire, Holland's ancient and most important Eastern possession, and America's latest colonial nurseling. Had Mr. Ireland only added German New Guinea, and compared the methods of administration of the three European nations owning that island, he would have rendered his subject altogether complete.

Excluding the Philippines, a chapter is allotted to each of the countries named above. The author uses them as standards of comparison whereby to gauge the methods and aims which have guided American statesmen in administering their new possessions in the Pacific, and concludes with four chapters on the latter, telling how the Philippines were acquired, how they are governed, what is their present economic condition, and what the policy which actuates their rulers. Finally, in the appendices a number of statistics are given from the recent Philippine census.

The book, as will thus be seen, is in the main what its sub-title implies, and would therefore seem to lie somewhat more in the realm of politics than geography. But this is by no means entirely the case, for the author always keeps in view the environment and the geographical why and wherefore of things, and his conclusions are thus of distinct interest. Mr. Ireland's style, moreover, is conspicuous for clarity of reasoning and expression, and his criticism is so eminently characterized by sound common sense and acute observation that he should carry conviction in the minds of most of his readers. Apart from a curiously involved sentence which opens chapter x., Mr. Ireland is quite French in the clearness and neatness of his argument—a rare enough characteristic in these days of hasty writing. Owing to the condensation necessary in bringing so wide a subject into so restricted a space, the volume does not readily lend itself to detailed review, but some of Mr. Ireland's remarks are particularly instructive, and demand a word of notice here. Taking the English possessions, he is evidently of opinion that where failures arise they are brought about in most cases by the interference of the home authorities. Thus, whereas in the case of Sarawak he finds himself "unable to express the high opinion I have formed of the administration of the country without a fear that I shall lay myself open to the charge of exaggeration," in Hongkong and British North Borneo, on the other hand, the persistent ignoring of the views of those in command on the spot evokes sharp criticism. In the former colony the system of indexing the official correspondence is described as one of utter confusion, and in no one place is there a complete set of the printed records of the colony, thus showing marked contrast with Java, where he found more perfect methods of work, a more thorough system of records, and a more intelligent appreciation of the functions pertaining to a colonial secretariat than he met with in any other of the countries he visited. Yet Mr. Ireland has no preference whatever for the Dutch system of educating Indian civil servants as against ours; indeed, he thinks it distinctly faulty, the examinations being directed almost exclusively to a knowledge of local and technical subjects. It seems, nevertheless, as most persons acquainted with the Netherlands India will testify, to be attended with remarkably good results.

The four chapters devoted to the Philippines are a good exposition of the

difficulties which confronted the Americans on taking over the archipelago, and how they attempted to deal with them. Their aim, as Mr. Ireland well puts it, was the introduction into a community, whose social and political conditions were the product of the superimposition of mediæval European ideas upon tropical tribalism, of an administrative system representing five centuries of growth beyond the mediæval stage, and depending for its success upon a homogeneity of which scarcely a trace existed in the islands. Side by side with excellent intentions there existed an ignorance of the broad established data concerning tropical administration, and an absence of information as to the work of the European nations in neighbouring colonies which was deplorable. The whole future of the Philippines Mr. Ireland conceives to lie in the labour question, and the outlook, he thinks, is not encouraging. The natural resources of the islands can never be made accessible to mankind without the use of imported labour, to which, of course, America is strongly opposed. The new owners of the land have failed to grasp the importance of the environment, and, in trying to make the Filipino into an American, have lost sight of the fact that every natural circumstance which has made American civilization what it is is non-existent in these tropical latitudes. Pending the appearance of Mr. Ireland's larger work, which is to be issued in ten or twelve volumes in America during the course of the next four years, the book before us may be cordially welcomed as an interesting study in outline of what is practically a novel subject. If the author's suggestion be adopted that a post, or posts, of inspector of colonies should be created, the duties of which would consist in visiting our oversea possessions in rotation, and investigating the work and methods in vogue, probably few persons could be found more fitted for such an appointment than himself.

F. H. H. G.

Through China to Burma.

Unter Chinesen und Tibetanern.' Von A. Genschow. Rostock i. M.: C. J. E. Volckmann. 1905. Pp. vi. and 384. *Maps and Illustrations. Price* 6*s.*

The author went south from Peking to Hankow, then west to the Tibetan border, and on to Burma *viâ* Atun-tze and Talifu. Beyond Ichang he (like Colonel Manifold on his latest expedition) crossed the mountains south of the Yangtse instead of following the river. On the Tibetan border he travelled for the most part by routes already followed by Captain Gill, the members of the Davies-Ryder survey expedition, and others. Between Atun-tze and Tali, however, he seems to have been in part on new ground, so that some additions to our knowledge, in points of detail, have resulted from the journey.

AFRICA.

A French Expedition to Lake Chad.

Commandant Lenfant, 'La Grande Route du Tchad.' Mission de la Société de Géographie. Paris: Hachette. 1905. Large 8vo. Pp. 288. *Maps and Illustrations. Price* 12 *francs.*

In this work the well-known French explorer gives a detailed narrative of his successful expedition to Lake Chad by the Benue route, the main outlines of which had been given to geographers in his paper read last year before the Paris Geographical Society, and summarized at some length in the *Journal* (vol. 24, pp. 202–206, with map). The material there presented has been amplified in the present work, but the main conclusions are necessarily the same, so that it is superfluous to speak of them in detail. The book bears abundant testimony to the thoroughness and enthusiasm for his work which have distinguished Captain

Lenfant throughout his whole connection with Africa. He has always an eye for the physical processes which have in course of time moulded the surface features of this part of the continent, and his explanations of its past physical history, though at times dependent, perhaps, on hypothesis, are based on a thoughtful and intelligent study of the problems presented. It is from this point of view that his work has the greatest interest to the geographical student. The possibilities of water-communication from the Atlantic to Lake Chad, which have been acclaimed with so much enthusiasm as established by his expedition, will hardly perhaps stand the test of calm and unbiassed reflection; and even before the journey now described had been made, it was sufficiently obvious that the Benue route would be the most feasible to the French Central Sudan, once it were conceded that an all-French route might be dispensed with. The tracing of the physical connection between the basins of the Niger and Shari, so long suspected but never before clearly elucidated, is, on the other hand, a decided contribution to our knowledge of African geography. The phenomenon of a water-discharge in two different directions, such as takes place, at high water at least, from the Tuburi marsh, is by no means unknown to geographers. But it is sufficiently uncommon for every new example to be of interest, and this is heightened, in the case of the Shari and Benue systems, by the somewhat special features which have been found to exist. Thus the Tuburi swamp lies on the elevated plateau of Central Africa, and, while the drainage to the north by the Logone never leaves that plateau, the western outlet has worn itself a deep channel through its outer edge, and makes its way to the lowlands drained towards the Atlantic ocean. We thus seem to witness the early stage of an erosional process whereby the whole Shari basin might, in the course of ages, find an outlet to the sea.

Besides sketching, in various interludes interspersed in the narrative, the broad characteristics of the physical geography, as well as the ethnography, of the region, Captain Lenfant repeats the conclusions arrived at in his former paper as to its economic possibilities which, in spite of all optimism, certainly do not seem over-attractive. The book is profusely illustrated by photographs and drawings, and its own merits might have entitled it to dispense with the laudatory prefaces, which seem, however, to be considered a necessity in French works of travel.

AMERICA.

Mexico.

'Le Mexique, au début du XX^e^ Siècle.' Par MM. le Prince Roland Bonaparte, Léon Bourgeois, Jules Claretie, d'Estournelles de Constant, A. de Foville, Hippolyte Gomot, O. Gréard, Albin Haller, Camille Krantz, Michel Lagrave, Louis de Launay, Paul Leroy-Beaulieu, E. Levasseur, le General Niox, Alfred Picard, Élisée Reclus. Two volumes quarto. *Maps and Plates.* Libraire Ch. Delagrave, Paris.

Under various headings, this is a compendium of the present condition of Mexico—population, political institutions, agriculture, mines, industry, public works, post and telegraph, finance, foreign relations and geography. All of these subjects are handled with that skill, lucidity, and comprehensive grasp characteristic of the talented experts whose names are above given.

Mexico is much reduced from the original area which it had when Cortez gave it to the crown of Spain; but it still has 767,000 square miles. Its population has greatly increased during the last forty years, and now numbers about 14,000,000. Prince Bonaparte divides it into whites 20 per cent., mixed 40 per cent., and Indians 40 per cent. From personal observation over two-thirds the area of the country I

am disposed to change these proportions into whites 10 per cent., mixed races 30 per cent., pure blooded Indians 60 per cent.

It is worth remark that the great President Benito Juarez, who finally broke up the baneful rule of the priests and inaugurated the present era of Mexican progress, was a pure-blooded Zapoteco Indian, while the existing President Porfirio Diaz, who had so wisely guided the progress of his country, is largely of Indian extraction. An observant traveller must recognize in many parts of Spanish America that the virility of the Indian blood seems to be reasserting itself, in the same way that the ancient Roman blood appears to be slowly coming to the front again in Italy. It may be said to-day that the average Mexican is prouder to count his descent from some *cacique* of the days of Montezuma than he is to trace some Spanish *conquistador* among his ancestors. He is developing a civilization of his own, and this is perhaps confirmed by Prince Roland Bonaparte: "Immigration is much inferior to that which existed in the colonial epoch. In fact, at the commencement of the last century, when Mexico had but about 6,000,000 of inhabitants, there was a minimum of 60,000 Europeans there, the great majority of whom were from the Iberian peninsula, and consequently were called *peninsulares*. To-day there can be found but 50,000 individuals proceeding from Europe and the United States and belonging to the white race;" and he closes with a remark, with which we cannot agree, "Frankly, this is a deplorable state of things; it should be remedied." Then follows a contradictory statement: "In the neighbourhood of the United States the Mexican population is rapidly becoming more strongly compact, which will permit it to resist, in case of need, the infiltration of North Americans so often announced." It was the idea of Louis Napoleon, in his invasion of Mexico, that the advance of the Anglo-Saxon in the New World should be curbed.

A valuable and useful chapter deals with the past and present agricultural conditions of the country and its future possibilities, while under the title of "Mines" we have an exhaustive treatment of the wonderful mineral wealth of Mexico, and how it is being developed. The article on "Industry and Commerce" must command attention from those who suppose that Mexico is only a land of minerals.

Perhaps under the heading of "Railways and Public Works" we may judge best of the modern advancement of Mexico. The first railway was completed in 1867, the year of the downfall of the Maximilian empire. It is 424 kilometres long, and connects the capital with the port of Vera Cruz. In 1901 the total length of lines opened for public traffic was 14,534 kilometres. Telegraph lines have also rapidly increased in number. In 1867, "after the retreat of the French Intervention and the settling down of the Republic," the Government took in hand the extension of the few short private lines then working, and by the opening of the present century it had 31,346 kilometres in operation. "To-day," says Lagrave, "there is not in Mexico any populated centre of medium importance which is not served by a telegraph line."

M. de Foville illustrates his articles with engravings of ancient and modern Mexican coins. He gives the silver exportation in 1878 at 24,836,903 dollars, and in 1901 at 74,326,406 in coin and ingots, and the gold exportation for the latter year at above 9,000,000. M. Leroy-Beaulieu, with a masterful pen, outlines "Finances" from the date of the independence of Mexico to the present time. In 1866 the receipts of the national treasury were but 5,057,000 dollars, and the average of four years did not exceed 6,500,000. From 1868 to 1877 the average receipts were 16,611,000 dollars yearly. At the latter date General Porfirio Diaz *assumed* the presidency. For the financial year 1901–1902 the income of the treasury was calculated at 61,694,000 dollars, but it must not be overlooked that in the mean time silver had sunk to one-half its previous value. The foreign trade

was, in 1902–1903, 220,010,811 dollars in imports, and 219,402,064 in exports. Internal finance and foreign loans are comprehensively treated, and M. Leroy-Beaulieu closes his chapter with the following tribute to Mexican administrative talent:—

"This Latin Republic makes a good figure by the side of the great Anglo-Saxon Republic. It shows its ability to preserve its physiognomy, its traditions, its originality, and to do honour to the Latin race."

Public instruction makes marked and healthy advancement, both as regards primary and higher education, while art and sciences are by no means forgotten; and M. Claretie tells us of the great strides which literature has made since the days of President Juarez. Mexico now has four academies—languages, jurisprudence, science, and history.

General Niox states that the effective army consists of 3500 officers, 31,000 men, and 11,000 horses; but that Mexico could maintain a force of 140,000 men.

The work closes with a very instructive chapter on "Foreign Relations" from the date of the independence of the country until the present time. It calls attention to the *Monroe Doctrine*, the result of Canning's efforts to get the United States to join England in a declaration "against all attempts hostile to the independence of the ancient colonies of Spain."

Campaigning with Juarez against the empire, I recall that the imperial army was always accompanied by an artist, whose business it was, whenever the troops of Maximilian captured a city, to paint a crown upon the head of the eagle of the coat-of-arms of Mexico which was always found over the doorway of Government buildings. Our ragged, patriot force could only afford a common soldier with a paint-pot; and, whenever we retook a city, it was his duty to daub out the emblem of royalty. He may not have been so good an artist as the one who painted it, but he did his work thoroughly, for he felt that he was making a Spanish-American translation of the Monroe Doctrine.

GEORGE EARL CHURCH.

POLAR REGIONS.

EARLY HISTORY OF SPITSBERGEN.

'Early Voyages to Spitsbergen in the Seventeenth Century.' Edited, with Introductions and Notes, by Sir W. Martin Conway, F.S.A. London: Hakluyt Society, 1904. 8vo, pp. 191. *Maps and Illustrations.*

Though not concerned with any of the more important voyages of northern discovery (which have been dealt with pretty fully in previous publications of the Hakluyt Society), this volume supplies some interesting information, not readily accessible elsewhere, on the doings of the English, Dutch, and Biscayan whalers in the early part of the seventeenth century. The longest and most important items are (1) a reprint of Hessel Gerritsz's rare tract, published in French at Amsterdam in 1613, in which, besides a sketch of the discovery of the islands and a description of their general character, the grievances of the Dutch whalers against their English rivals are set forth at length; (2) the journal, by Van der Brugge, of the successful wintering in Spitsbergen of seven Dutch seamen in 1633–34. With the exception of the wintering in the same region of the seven English sailors whose experiences were related by Edward Pellham in 1631, this was the first occasion on which the rigors of the Arctic climate had been successfully endured during a winter in Spitsbergen; so that the details of the daily life of the hardy seamen, and the observations on the natural phenomena of that remote land which are recorded by Van der Brugge, will be read with much interest. Both these narratives now appear for the first time in an English version. Sir Martin Conway

supplies brief introductions to each of the pieces he has printed, thus linking together the events dealt with into a more or less connected narrative. It is the history of whaling enterprise, rather than of geographical discovery, that is kept in view throughout, and it might be wished that the editor had said more on the latter subject. Thus a brief summary of the conclusions reached by him with regard to the voyages of Barents and Hudson, already dealt with in the *Geographical Journal*, would have been useful, as would also a general map of the Spitsbergen group, the only part included in the one inserted being the extreme north-west. This was, it is true, the special field of activity of the Dutch whalers, but other parts of the group come also into question incidentally. The editor has paid much attention to the elucidation of the complicated nomenclature of Western Spitsbergen, and his conclusions will help materially towards an understanding of these early voyages.

Reproductions are given of John Daniel's map (1612), used by Gerritsz to illustrate his treatise; of the chart of Maurits bay (the scene of the Dutch wintering), published in 1655 in Doncker's 'Lichtende Columne;' and of the title-pages and illustrations belonging to Van der Brugge's Journal, and to another which appeared a year later. These illustrations, it should be remarked, are pretty close copies of certain of those in De Veer's account of Barents' voyages.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Geological Processes.

'A Treatise on Rocks, Rock-weathering, and Soils.' By George P. Merrill. London and New York, 1904. Pp. xx. + 411.

The space devoted to the three divisions of this work follows the order indicated in the title; 171 pages of text are devoted to rocks, 127 to rock-weathering, and 100 to soils. The first part is an abbreviated treatise on petrology, which covers the same ground as many other text-books. The second is the important part of the work, and the collected analyses showing the constituents which disappear in the weathering of different types of rocks are especially useful. In the third soils are treated solely from the geological side—that is, with reference to their mode of origin. In this part we notice one curious omission: though the action of ants and termites in carrying organic matter down into the soil is referred to, no mention is made of earthworms. Are there no worms in America?

THE MONTHLY RECORD.

EUROPE.

Evolution of the Map of Scotland.—Mr. J. E. Shearer, F.S.A. Scot., has contributed the first instalment of a paper on this subject to the June number of the *Scottish Geographical Magazine*. The subject of the early cartography of the British Isles has never been adequately dealt with in the light of modern knowledge, the accounts given in the older works, such as Gough's 'British Topography,' being necessarily deficient in certain directions, in which recent research has added to the sources of information. But while the subject is thus one which lends itself to further discussion, and Mr. Shearer's paper will be of use in calling attention to one portion at least of the field, it can hardly be said that his treatment of it is entirely satisfactory. While possessing a considerable knowledge of early maps of Scotland, he occasionally shows a deficient grasp of the general course of cartographical progress during the middle ages, which leads him to choose as types maps

that were perhaps second or third hand copies from earlier examples, or at least were unimportant representatives of their class. In particular, he passes over the whole field covered by the portolani of the fourteenth and fifteenth centuries (apart from a second-hand reference to them in a quotation from Nordenskiöld), many of which were far in advance of the printed maps of even a later date. As an instance of the delineation of Scotland as an island by continental map-makers, he chooses the map in Bordone's 'Isolario' of 1528, though this is, of course, quite a late instance of this feature. In regard to early English maps, again, he lays somewhat undue stress on the insular character assigned to Scotland, the delineations of Matthew Paris and others bearing witness to the vague idea of a close approximation, in the neighbourhood of Stirling, of arms of the sea by which the opposite coasts were pierced,* but hardly to a definite belief in a continuous waterway. Even in the Hereford map the dividing channel is named *river* Tweed (Fl. Twede), while in many of the early portolani (based, no doubt, on English information) a distinct dividing-line is shown across the waterway. Mention might have been made of the map in the Venice Ptolemy of 1511, which shows Scotland with correct orientation from north to south. A knowledge of this (with other maps of the early sixteenth century) would have obviated the misstatement that Leferi (*sic*) was "the first printer (after Ptolemy's Britain of 1478) of maps of this country." The paper contains reproductions of several of the maps alluded to.

Distribution of Population in Brittany.—Attention has frequently been called to the influence exerted by the sea on the grouping of population in Brittany, which is strikingly seen in the comparatively dense aggregations on the seaboard, and the marked sparseness of population on the interior plateau. A more detailed study of the facts and causes of this distribution than had previously been made has lately been undertaken (under the guidance of M. de Martonne) by M. E. Robert, who presents the results in the *Bulletin de la Société Scientifique et Médicale de l'Ouest* (vol. 14, No. 1, 1905), reprinted as No. 4 of the *Travaux du Laboratoire de Géographie de l'Université de Rennes*. The author points out that neither the geological structure, the relief of the soil, nor yet the hydrography, are such as to account in themselves for the observed facts of distribution, their tendency being to induce throughout a segregation of the population into isolated settlements; a tendency favoured, too, by the lack of well-developed communications. Statistics show, however, wide differences between different cantons, and these are seen to be due mainly to the relative positions of the areas with regard to the coast, the geological structure being perhaps identical. They are not so much due to the existence of large centres along the coast-line, as to the relatively close proximity to one another of the small settlements, which also show a marked air of prosperity and animation as compared with the interior hamlets. It is the sea, by supplying means of contact with the outside world, which has been the source of this relative activity and progress on the borders of the peninsula. In order to bring out this influence as clearly as possible, M. Robert has divided the whole of Brittany into zones of equal distance from the coast, calculating the average density for each of these and showing them on a map by a scale of tints. Difficulties are of course encountered in the attempt to determine the actual population of each zone, especially from the fact that the individual communes sometimes extend into two if not three different zones. This particular difficulty has been met by distributing the population of the communes in proportion to the number of hearths recorded

* It is not quite correct to call these the Firths of Forth and Clyde, the latter river, with Glasgow, being shown further south, though the most pronounced firth on the west side has been misplaced northwards.

within each zone. M. Robert's study, to analyze which in detail would carry us beyond the limits of space available, enters into other questions beside the influence of nearness or distance from the sea. Thus the whole area is subdivided into natural regions, and the special factors in each which may tend to modify the general law are clearly brought out. A word of caution as to the conclusions to be drawn from the map is perhaps advisable, otherwise a mistaken impression might perhaps be carried away. It must be remembered that by the mere choice of the particular mode of subdivision adopted (by which the actual course of the lines dividing different densities is determined), the facts corresponding with this are emphasized at the expense of other possible principles of distribution, which are liable to be left out of sight. To take an example, we may suppose an area in which the population is concentrated into several parallel river-valleys running at right angles to a coast-line, becoming, however, less and less dense as the distance from the sea increases. On the basis adopted by M. Robert, the successive densities would be shown as running in zones parallel to the coast, while had the division been made by lines perpendicular to the latter, we might have obtained a series of bands running in this direction, and representing the varying densities of the river-valleys and uninhabited tracts between them. In each case the fact brought out is a real one, but another of equal value is disregarded.

The Oeschinensee in the Bernese Oberland.—An unusually careful examination of the limnological features of the Oeschinensee—a small mountain lake at an elevation of 5188 feet—has been carried out by Dr. Max Groll, of Berlin, who has described his researches and their results in a brochure of seventy-eight pages, with maps and sections (Bern: Haller'sche Buchdruckerei, 1904). Dr. Groll set about his task, which occupied him at intervals from 1901 to 1903, with characteristic German thoroughness. Finding the features of the lake-shores not delineated with sufficient exactness for his purpose in the official maps, he himself undertook a careful large-scale survey with the aid of Herr Schüle of the survey department at Bern. In order to fix the positions of the soundings with the greatest possible accuracy, ropes, marked at intervals of 25 metres, were stretched across from shore to shore, and soundings taken at the points of subdivision. The level of the lake surface was carefully noted from day to day, and the soundings all reduced to a uniform datum. They were taken only during calm weather, and are estimated to have a probable error of only ± 5 cms. (about 2 inches). The lake is regular in outline, measuring, at high water, 1860 yards by 1088. Its maximum depth, 185 feet, is above the average for lakes of its class. The water was at an unusually low level on the occasion of some of Dr. Groll's visits, and he was able to recognize by ocular inspection the three different zones defined by Forel, viz. the shore-zone, the steep slope ("Halde"), and the floor. In the case of the Oeschinensee, the first-named zone merely continues the morphological features of the shore above water, its angle of slope depending on the size of the detritus of which it is composed. The more or less level floor occupies more than one-third of the whole area. The chief morphological elements are calculated as follows:—

	At normal level.	At low water.
Area	0·45 square mile	0·33 square mile
Length of shore-line	3·2 miles	2·5 miles
Shore development	1·5	1·2
Volume	1,410,000,000 cub. feet	882,000,000 cub. feet
Greatest depth	185 feet	136·5 feet
Mean depth	113·5 feet	96·7 feet

Dr. Groll enters fully into the rise and fall of the lake (the lowest level was observed in March, the highest in September); the transparency (greatest when the water is lowest, as then the influx of sediment practically ceases), and colour (due when blue to the purity of the water; when green, to the presence of matter in suspension, and possibly also in solution); and, especially, to the temperature conditions, to an explanation of which he pays much attention. Some of the more striking points brought out are as follows: (1) a cooling sets in in autumn, both on the surface and in the lower layers, while a *rise* of temperature is observed at intermediate depths; (2) the temperatures remain in winter virtually constant under the ice; (3) at the end of winter a slight rise of temperature was observed beneath the ice, while that of the lowest layers continued to fall. This rise Dr. Groll considers to be due to the entrance of water from the mountain streams. The depth to which the upper layers of lakes may be cooled below the temperature of maximum density he likewise attributes to the access of cold water heavily charged with sediment, which therefore sinks below the level at which its temperature would otherwise cause it to rest.

ASIA.

A New Indian Province.—It has been felt for many years that the enormous and rapidly growing population of Bengal, and the expansion within it of commercial and industrial enterprise, have placed a burden on its existing administration which, in the interests of efficient oversight over the whole of the vast area, urgently needed lightening. The subject was brought to the front as a practical question by a letter addressed by Mr. Risley, Secretary to the Government of India, to the Bengal Government in December, 1903, in which a sketch was given of the various suggestions which had been made to cope with the difficulty, and of the measures advocated after full discussion by the Central Government. These have since received careful consideration by the local authorities interested, which have in the main given their cordial support, making, however, suggestions on minor points which have, in many cases, been accepted by the Government of India. A final decision was reached in a resolution of the latter, dated Simla, July 19, 1905, by which Bengal is relieved of an area carrying a population of over 24 millions, out of a total of 78¼. This important step has not been taken without earnest consideration of the interests involved, and though it has aroused opposition in some quarters, the means adopted certainly appear the best that could be devised for the end in view. The transfer of territory which has been made is somewhat complicated, involving various adjustments between contiguous areas. Of the administrative divisions bordering on Bengal, the Central Provinces and Assam were alone in a position to add to their existing responsibilities. Both Orissa and Chutia Nagpur have in the past come under consideration as parts of Bengal which might suitably be transferred to the Central Provinces, and in the case of the latter a partial adoption of this idea has resulted in the transfer of the five native states, forming a solid block with Hindi-speaking population, which have hitherto been attached to the division, but, owing to their remoteness, have not received the administrative attention they need. The British districts of Chutia Nagpur are retained under the Bengal Government principally from commercial considerations. As regards Orissa, with its Uriya-speaking population, it has been felt that its transfer to another government would involve insuperable difficulties, while the completion of the east coast railway has brought the division into closer relations than ever with Calcutta. But not only is Orissa left with Bengal, but in deference to the widely felt desire on the part of the Uriya-speaking peoples to be united under one administration, a considerable area (including the greater part of

the Sambalpur district) has been transferred from the Central Provinces to the Orissa division. The net relief to Bengal on the south-west is therefore not great, and more radical changes on the east were necessary in order to gain the desired end. It has therefore been decided to cut off the whole of Eastern Bengal (including, besides Dacca and Chittagong, the districts of Rajshahi, Dinajpur, Jalpaiguri, Malda, and Chittagong), and to unite it with Assam to form a new administration of the first class, to be known as "Eastern Bengal and Assam," with the status of a lieutenant-governorship, and possessing a Legislative Council and Board of Revenue, though remaining under the jurisdiction of the High Court of Calcutta. The province will have an area of 106,540 square miles and a population of 31 millions, with its capital at Dacca, and subsidiary headquarters at Chittagong. It is pointed out that it will have a well-defined western boundary corresponding with well-recognized geographical, ethnological, social, and linguistic characters; that the typical Mohammedan population of Bengal will be concentrated in a single province; and that practically the whole of the tea industry and the greater part of the jute tracts will be brought under a single government. The whole of the Assam-Bengal railway will also fall within the new province, and it is hoped that a great impetus will be given to the development of Chittagong as a natural outlet for the trade of Assam and Eastern Bengal. A Parliamentary paper has been issued containing the memorandum of December, 1903, and the recent resolution of the Indian Government.

The Franco-Siamese Boundary.—The delimitation on the spot of the new boundary fixed by the agreement of last year between the Gulf of Siam and the Great Lake of Cambodia has been in progress for some time, and in spite of difficulties which have arisen in the course of the operations, a line has been at last adopted which has received the approval of both sides (*B. Comité de l'Asie Franç*, July, 1905, with map). The course which the line would have taken had the strict letter of the agreement been followed, proved unsuitable from the French point of view when the country was examined, and in their desire to arrive at a lasting settlement the Siamese commissioners, after some demur, accepted a revision of the frontier in several localities, the result in each case being to add somewhat to the territory assigned to France. In the Krat region, instead of leaving the coast at Cape Lemling (in which case the full value of the anchorage assigned to France between Koh Chang island and the mainland would, it is said, have not been realized), the boundary has been shifted to the southern shore of the estuary of Paknam Ven. It then runs across to the Klong Yai, follows this stream and ascends the Klong Reng to the Cardamom mountains, running due south for some distance along these, and then striking nearly due north again. This leaves a narrow wedge of Siamese territory within that of France, and it is to be expected that this will give occasion in the future for a further demand for a rectification. Further east the frontier has again been shifted north so as to follow the upper course of the Mung river (an affluent of the Great Lake) before striking across to the Prek Kompong, which forms the dividing-line to the south of the lake.

Mr. F. H. Nichols' Journey across China to Tibet.—We recorded last year (*Journal*, vol. 24, p. 677) the unsuccessful attempt made by Mr. F. H. Nichols, an American traveller, to penetrate Tibet from the east. After reaching Rangoon *viâ* Bhamo, Mr. Nichols went to India and entered Tibet by way of Darjiling and the Chumbi valley, but died on reaching Gyangtse without realizing his design. The June number of the *Bulletin* of the American Geographical Society contains notes from Mr. Nichols' diary, kept during his journey through China from Ichang to Ta-chien-lu, which show him as a capable observer and add to

the regret that he was unable to carry out the work which he had set himself. Unfortunately, the notes cease before the arrival at Chiamdo, where the traveller was on less-known ground, and where he spent many months in preparing himself for his intended journey by the study of Tibetan.

Morphology of the South-West Coast of Sumatra.—During journeys as a geological expert on the little-frequented south-west coast of Sumatra, in the middle and southern parts of the Benkulen residency, Dr. J. Erb was able to add somewhat to our knowledge of the physical history and features of this coast, hitherto based on rapid reconnaissances only. As regards the geological formations (mostly of late Tertiary age), while not discovering any not previously known from Sumatra, he verified the existence on the west coast of some that had previously been known on the east only. Structurally, the two coasts show a marked contrast, in that the Tertiary formations are folded and thrown into anticlines on the east, while on the west the strata are merely inclined at a low angle, as they pass under the Indian ocean. The movement which gave rise to the present coast-line in Pleistocene times took place here mainly in a vertical direction, the lateral pressure which folded the rocks on the east having been absent. The present coast originated in a system of longitudinal faults, accompanied by a rise of Southern Sumatra relatively to the Indian ocean. The south-east to north-west direction of the coast is parallel to the general direction of the volcanic zone of the central range, and to the Pleistocene folding in the Palembang residency, as well as (apparently) to the system of folds in the Barisan range. Among the agencies by which the coast has been and is being modified, the principal are the heavy surf, and the coastal current which runs towards the north-west, or in the opposite direction to the ocean current outside the line of the Engano and Nias islands. It corresponds, however, with the direction of the most prevailing winds, which from May to September are the south-east trades along the whole southern section of the west coast. Dr. Erb says that the cause of the current is the oblique direction in which the waves strike the coast, though this again would be due to the direction of the wind, which would be the primary cause of both phenomena. A result of the current is a general transport of shingle along the coast, a fact which can be observed at many of the river mouths, which have been diverted to one side. It is only in the case of rivers of intermediate size that this is observable, for while the largest rivers have sufficient power to sweep away obstructions, the small streams become blocked at their mouths by shingle, through which the water finds its way in great part by percolation. With its few bays and the total absence of serviceable harbours, this coast offers few inducements for settlement, and even fishing is very little practised along it. Dr. Erb discusses the nature of the coral reefs which extend along a portion of the coast, and brings together a considerable number of facts bearing witness to a recent elevation of the island, or a portion of it, holding that the want of uniformity which has evidently characterized this movement is a reason for rejecting the idea that a recent fall in the level of the Indian ocean has taken place.

The Khatanga Expedition.—The July number of *Petermanns Mitteilungen* records the arrival of the Tolmacheff Expedition at Lake Yessei in April last, after a journey in which great cold had been experienced. The route had been laid down with the help of ten astronomically fixed points, and much had been done to throw light on the river-systems of this part of Siberia. Among the streams explored were the Kotui, the main head-stream of the Khatanga, the Kureika, and the Severnaya, a tributary of the lower Tunguska, which is fed in part by a lake lying in 68° N. Lake Yessei was found to lie 2° further south than it has been

hitherto placed. The explorers purposed to go south to the second lake-source of the Khatanga—the Monere—and afterwards to explore the group of small lakes known as Voyevoti. After descending the Khatanga to the sea, the various members of the expedition hoped to return by different routes, the leader crossing the Vilui region to Olekminsk, while Baklund would make his way by Lake Yessei and the old route of Middendorf along the limit of forest growth to Dudino.

AFRICA.

The Segonzac Expedition in Morocco.—The Marquis de Segonzac, whose recent travels and captivity in Morocco were referred to in the May number of the *Journal* (vol. 25, p. 564), has since been released and has safely returned to France, accompanied by his coadjutors, MM. Gentil and de Flotte Rocquevaire. Some account of the work accomplished by the expedition, which, in spite of the leader's imprisonment, was on the whole a decided success, has appeared in the *Bulletin* of the *Comité de l'Afrique Française* for May last. The greater part of M. de Segonzac's own route has already been briefly described in the *Journal* (*loc. cit.*). His objects were, in particular, to study the two versants of the central main range of the Atlas, and the connections between this and the Middle and Anti-Atlas; the possibilities of communication between south-east Algeria and southern Morocco; the economic resources of these regions, their inhabitants, and political and religious relations. After crossing from the sources of the Muluya to the south side of the main Atlas by the Tunfit pass, at the foot of Jebel Aiashi, M. de Segonzac made his way to the headwaters of the Dra, through the territory of the Ait-Atta, belonging to a religious brotherhood independent of those of Tafilet (left by the traveller on his left) and the upper Dra. From Tamgrut he went due west along the southern edge of the anti-Atlas, through a semi-desert region broken by the valleys of the right-bank affluents of the Dra, and inhabited both by settled Berbers and by nomad Arabs. Great insecurity reigns in these regions, and the traveller's imprisonment was due to his being denounced to a band of professional pillagers, the Uled ben Tabia. His release was finally secured by Sheikh Hamu-ez-Zenagi, chief of the powerful Zenaga tribe, and he was able to save his notes and the greater part of his collections. His return journey was made across the last northern spurs of the Anti-Atlas to the remarkable circular plain of the Zenaga, and on by Tazenakht and Tikirt, through an interesting region in which a friendly welcome was extended to him as a French traveller. He has brought back scientific observations of all kinds. The journeys of M. Gentil, the geologist of the expedition, promise equally valuable results. Besides a short expedition in the neighbourhood of Tetuan, he made three separate journeys in the western part of the main Atlas and the coast region south of Mogador, making many observations on the geology and topography. The third journey, which entailed considerable hardships, led south from Demnat across the range, during the passage of which M. Gentil was fortunate enough to discover the first fossils by which it will be possible to determine the age of the ancient axis of the range in these parts. On the southern slope, too, he met with the remains of a fine Carboniferous fauna. Passing through Tikirt, he examined the neighbourhood of Jebel Sirwa, whose granite base supports well-preserved remains of volcanoes, apparently of Tertiary age. Further Carboniferous fossils were found on the return route to Marakesh. M. de Flotte Rocquevaire was entrusted with the triangulation of the Huz and the western part of the Atlas, and his labours will be of great value for the co-ordination of the work of previous travellers, which have hitherto lacked a common basis. Bearings were taken from sixty-six stations, and the co-ordinates of about 300 positions carefully fixed.

AMERICA.

Vicissitudes of an Eighteenth-century Map.—Mr. Henry N. Stevens has brought out an interesting pamphlet setting forth the surprising vicissitudes through which a map of the British American colonies passed during the latter half of the eighteenth and the early years of the nineteenth century. The original map was prepared by Lewis Evans and published at Philadelphia in 1755, accompanied by a quarto pamphlet supplying an 'Analysis of a General Map of the Middle British Colonies in America.' The map, which measures about 26 inches by 19½, was on the approximate scale of 36 miles to the inch, and much care was bestowed on its preparation, an immense amount of information having been collected by Evans for the purpose. The pamphlet drew attention in particular to the need of checking the French encroachments and the advantages to be gained from the establishment of settlements on the Ohio. The general state of affairs in North America rendered the map of special interest at the time, and some copies were sent to England and issued in London by R. and J. Dodsley. It soon attracted the attention of the map-publisher, Thomas Kitchin, who practically copied, re-engraved, and published it in 1756, professedly with improvements, though these are by no means manifest. This was but the first of a long series of piratical re-issues, which were continued to at least as late as 1807, when, for the fifth time, the old plate, prepared by Kitchin in 1756 (which had subsequently passed into the hands of Thomas Jefferys), was utilized for 'A New and General Map' of the Middle States of the Union, all mention of Evans's name being now omitted from the title. But this was not all. In 1771 the original map had for the second time been re-engraved on a new plate, this time by Carington Bowles (equally without licence from the representatives of the original author), and this plate did duty for three successive issues, the last being possibly as late as 1800. In 1776 a corrected version of Evans's original map and pamphlet was prepared by Governor Pownall, who had throughout taken much interest in Evans's work, and who devoted the proceeds to the benefit of the daughter of the latter, who had been left in straitened circumstances. Thus in the course of half a century no fewer than ten separate versions of this 'Map of the Middle British Colonies' saw the light, of which eight were piratical issues published without any real attempt to bring the subject-matter up to date. The history of the map, the elucidation of which has involved a good deal of persevering research on the part of Mr. Stevens, throws a striking light on the methods too often employed by cartographers, who have exploited the ignorance or indifference of the public to their own profit.

AUSTRALASIA AND PACIFIC ISLANDS.

New Caledonia.—The report in the *Oesterr. Monatsschrift für den Orient* (Feb., 1905) of an official journey to New Caledonia by the Austrian consul in Sydney furnishes some useful data on the physical and political geography of the island. Contrary to the general custom, the review of the political state of the island precedes the account of its physical geography; and such is here the right order scientifically, the political factor being in this instance more the key to recent modifications of the physical geography than *vice versâ*. The picture drawn of the motley ethnical elements, a feature in which New Caledonia has, perhaps, no match, is not flattering to present European civilization. In the last twenty-five years the native population has been reduced from 50,000 to 20,000, and, given a continuance of present conditions, is likely to be quite extinct within the next fifty years. A handsome and strong race, habituated to unrestrained freedom, and

satisfying at light cost all their economic wants, the Kanakas will not adapt themselves to a culture which for them means only hard and ungrateful toil in mines, factories, and wharfs, obnoxious European dress, and alcoholic vitiation. The white population numbers 26,000. Of these, 8000 belong to the official class, garrison, and the "better classes." In the penal institutions (now in process of abolition) there are now only 2000 inmates, the rest of the whites being free settlers and workmen. To the common and political criminals transported there have been added, since 1885, *relégués*, including beggars, drunkards, in short, the element the least advantageous for colonization. The criminal population, still bound to the island after a term of punishment, poisons the whole atmosphere morally. The redeeming feature in the working population are the Dalmatian and Croatian immigrants, a sound and sober people. They are, however, always intent on higher wages, and will any day throw up steady employment for the chance of a small enhancement. Earning each seven francs a day, and able to live in affluence on three, they yet restrict their food to potatoes and bread. The specially geographical section of the article includes a review of the natural resources and actual products of the island, imports and exports, industries, and more particularly mining.

POLAR REGIONS.

Return of the Ziegler Polar Expedition.—The *Terra Nova*, which sailed for Franz Josef Land early in the present summer for a renewed attempt to rescue the members of the Ziegler Expedition, returned to Tromsö on August 10th, having successfully accomplished its mission. During the northern voyage the ice-field was sighted on June 19 in 75° 57′ N., 36° 26′ E., and was entered on the 24th somewhat further east. The conditions were unfavourable, and the advance was much impeded by fog, but Salmi island was eventually sighted on July 28, and Cape Dillon reached the next day. Here six men of the missing expedition were found, and despatched on sledges to Mr. Fiala's headquarters, while the ship proceeded to Cape Flora, where twenty-one men were taken on board, afterwards returning to Cape Dillon, where the remainder of the expedition was embarked. The *Terra Nova* sailed homewards on August 1, getting clear of the pack after some difficulty on the 6th. It was fortunate for the members of Mr. Fiala's party that the relief expedition of the present year was not, as was the case last year, driven back by the ice without reaching its destination. The *America*, in which the original expedition sailed in the summer of 1903, was lost in the ice, with a large part of the stores, during the first winter, and had not the depôts left by former expeditions been found and made use of, the result might well have been disastrous. As it was, many hardships had been experienced, and there seems little doubt that many of the party would have succumbed to an enforced wintering for a third time in those regions. It will be remembered that the avowed object of the expedition was to reach as high a northern latitude as might be, and if possible to carry the American flag to the north pole. It has therefore been a failure as far as this object is concerned, no latitude approaching that of Nansen's or Cagni's furthest having apparently been reached, every effort to advance north being, according to the telegrams, frustrated by the unfavourable conditions. It has apparently been little more successful than the earlier expedition under Prof. Baldwin, whose failure to reach a high latitude aroused so much criticism; and this though it had the advantage of the preliminary work done by the latter, for to the depôts established by him it mainly owed its safety after the loss of the *America*. Some good scientific work is, however, said to have been done by Mr. W. J. Peters, of the U.S. Geological Survey.

Peary's Start for the North.—The *Roosevelt*, with Peary's expedition on board, sailed from New York on July 12 for the final attempt on the pole to be made by the gallant explorer. The whole equipment of the expedition has been organized in the most thorough manner, and no stone has been left unturned in the determination to ensure the greatest chance of success. The *Roosevelt*, as has been already stated in the *Journal*, has been specially built for the purpose, and is unusually fitted to withstand heavy ice-pressure, while the engines are powerful enough, it is hoped, to force a way through the heaviest ice. It is Peary's intention to take the ship to as high a northern latitude as possible, preferably on the north coast of Greenland or Grant Land, and from this base to advance north in sledges in February, 1906. As on previous occasions, he relies mainly on his Eskimo coadjutors for the success of the northern journey. The ship is provisioned for two years, and in the event of failure to reach a sufficiently advanced position during the present year, the final attempt will be postponed until February, 1907. A novel item in the outfit is an installation of wireless telegraphy, by the aid of which, with intermediate stations to be established *en route*, it is hoped to keep in touch with civilization until the sledge journey commences.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Causes of Ocean Currents.—This question, about which so many divergent views have been held, but which has of late years come to be regarded as virtually solved by the supposed demonstration of the preponderating influence of atmospheric currents, has been once more approached in a determined way by Dr. Nansen, who, in the first three numbers of *Petermanns Mitteilungen* for the present year, has discussed the fundamental problems connected with the existence of ocean currents, and sought to arrive at an explanation which shall harmonize both with theoretical considerations and with observed facts. The experience gained during the voyage of the *Fram* has given the illustrious explorer an unusual insight into the conditions of the problem, and some of his conclusions have already been put forward in the 'Scientific Results' of that voyage. But he has since continued his investigations and tested them by laboratory experiments, so that his discussion starts from an unusually firm basis. So complicated, however, is the subject, and so many the disturbing factors which tend to vitiate conclusions based on mathematical theory, that it will probably be long before any explanation can be universally accepted as final. To give one instance only. The coefficient of friction in the case of water has been calculated experimentally by physicists at 0·014; yet, as Dr. Nansen shows, the results obtained on this basis may, in certain cases, be so paradoxical as to show that in the case of ocean currents this figure is quite untrustworthy, and that the opposition to motion caused by friction, vortex motion, waves, and so forth may be 10,000 or even 100,000 times as great as has been supposed. Nansen differs fundamentally from most recent writers on the subject in his view that the influence of winds on currents, especially as regards their direction, is of comparatively slight importance. He shows that the effect of the Earth's rotation in causing a deviation from the direction of the wind has been entirely overlooked by Zoppritz and his followers, and that this fact vitiates all their results. Not only is it impossible for a wind (except on the equator and in special circumstances due to the influence of land-masses) to bring about a current coinciding with it in direction, but the vertical effect is also much less than has been supposed, and Dr. Nansen holds that currents started by winds must be more or less local or temporary in character. It is, in his view, the temperature difference between the equator and the poles which is the virtual agent in the production of currents, though winds may have considerable

influence on their rate. In this case, too, the influence of the Earth's rotation in causing a change of direction is, of course, most important, and this is examined with great care and thoroughness in the second of the two papers, the conclusions being based on actual experiments with a rotating vessel containing water. From these, Dr. Nansen passes to a consideration of the case of a globe uniformly covered with water, in which the difference of specific gravity would give rise to a current running in a spiral direction towards the pole, the transfer of water from the equator to high latitudes being retarded in proportion to the length of the course to be traversed. The existing main ocean currents can be explained as due to the modifications introduced by the existence of the continents. The last paper deals with currents due to evaporation and precipitation, especial note being taken of the influence of ice-formation.

GENERAL.

The Successor to Dr. E. Richter at Graz.—Dr. Robert Sieger has succeeded the late Dr. E. Richter as Professor of Geography at the University of Graz. The newly-appointed professor, who is already well known to geographers, was born in 1864 at Vienna, where he studied history and oriental languages at the university, and took his doctor's degree in 1886. He subsequently devoted himself to geography, which he studied under Simony, Kiepert, and Richthofen, and made two journeys for research in Scandinavia, giving some of the results in a paper on 'Lake-level Variation and Coast-changes in Scandinavia,' published in the *Zeitschrift* of the Berlin Geographical Society in 1893. Since that date he has written on a variety of geographical questions, including the fluctuations of the African and Armenian lakes, the physical history of the Lake of Constance, the "Karst" forms of glaciers, and other subjects. In 1898 he became A.O. professor at the newly founded "Exportakademie" in Vienna, and since 1903 had occupied the same post at Vienna University.

OBITUARY.

Elisée Reclus.

On July 4, Elisée Reclus died in his seventy-sixth year in a small Belgian village not far from Ostend, and the most sympathetic articles which have been devoted to him since in the press of all nations bear testimony to the extremely wide popularity as a writer, and the profound esteem as a man, which the great French geographer enjoyed in all civilized countries.

Jean Jacques Elisée Reclus was born on March 15, 1830, in a small town of the Gironde Department, Ste.-Foy-la-Grande, and his family have never broken their association with this part of south-western France. His father was a Protestant pastor—a man of great integrity of character and remarkable energy. So was also his mother, who reached a very great age, teaching in a school of her own foundation, and retaining wonderful mental energy till her very last days. Elisée was the second of a family of twelve, all of whom, brothers and sisters alike, have left their mark in life. His elder brother, Elie, became a well-known anthropologist, one of his brothers is a geographer, another an engineer, and one a surgeon of great repute. One of his sisters, Madame Dumesnil, was for the last twenty years his constant help in all his work.

Elisée Reclus received his first education in Rhenish Prussia, and later on he

entered, with his brother Elie, the Protestant Faculty at Montauban. Their father's intention was to make of them Protestant ministers. Neither of the two brothers felt, however, inclined to follow the vocation of their father. Karl Ritter was attracting at that time students from all parts of Europe by his wonderful generalizations concerning the Earth and its inhabitants, and both brothers, leaving Montauban in 1849, went to Berlin, making most of the journey on foot, and living chiefly on bread and fruits. The lectures of Ritter, like the works of Humboldt, undoubtedly left a deep impression upon all the subsequent work of Elisée Reclus. The Earth always appeared to him as a living being in its continuous variations, and the inhabitants of its different parts were intimately connected in his mind with the physical characters of the portion of the globe where they had developed; while the influence of Humboldt's poetical ways of interpreting Nature and describing it is evident in Elisée Reclus's style.

After the *coup d'état* of Napoleon III., Elisée Reclus, as well as his brother Elie, were compelled to leave France. He came to London in 1852, then stayed in Ireland, and finally went to America, where he visited the United States, Central America, and Columbia. This last journey he described in a charmingly written little book, 'Voyage à la Sierra Nevada de Sainte Marthe' (Paris, 1861).

Returning to France in 1857, Reclus took a lively part in both the scientific revival and the political movement which characterized the middle of the nineteenth century. These were the years when, by a series of monumental works, the foundations were laid of the mechanical theory of heat, the kinetic theory of gases, modern atomistic chemistry, the variability of species and modern biology altogether, anthropology, physiological psychology, and so on; while the political revival which took place after the Crimean war led, as is known, to the liberation of Italy and the abolition of serfdom in Russia, and slavery in the United States. Reclus contributed his part to both these movements. The need of good popular works in all branches of natural science was deeply felt at that time, and in 1864 he published (besides an 'Introduction au Dictionnaire des Communes de France') an extremely well written little book—which he considered later on as his favourite work—'Histoire d'un Ruisseau,' in which he gave quite a course of geography by following a stream from its birth till it becomes a mighty river and an artery of human intercourse. The substance of the method which Reclus followed later on with such a success in his 'Universal Geography,' was thus contained in this 'History of a Brook.'*

Three years later, in 1867, appeared the first volume of his 'La Terre: Description des Phénomènes de Globe,'† which at once conquered for him a place of honour amongst geographers. This work, which is a necessary introduction to the 'Universal Geography,' is a true product of the scientific revival of those years, and represents an admirably told physical geography. The life of the continents, their distribution on the globe, their architectonic features, the laws governing their outlines, as well as the distribution of the plateaus, the lowlands, the deltas, and the deeply indented peripheric regions, all these problems of comparative earth knowledge are dealt with, and the corresponding features described with admirable lucidity in the first volume of 'La Terre.' The oceans and the atmosphere were dealt with in a subsequently published second volume. All the characteristics of Reclus's geographical work appear already in 'The Earth.' He pays just as much

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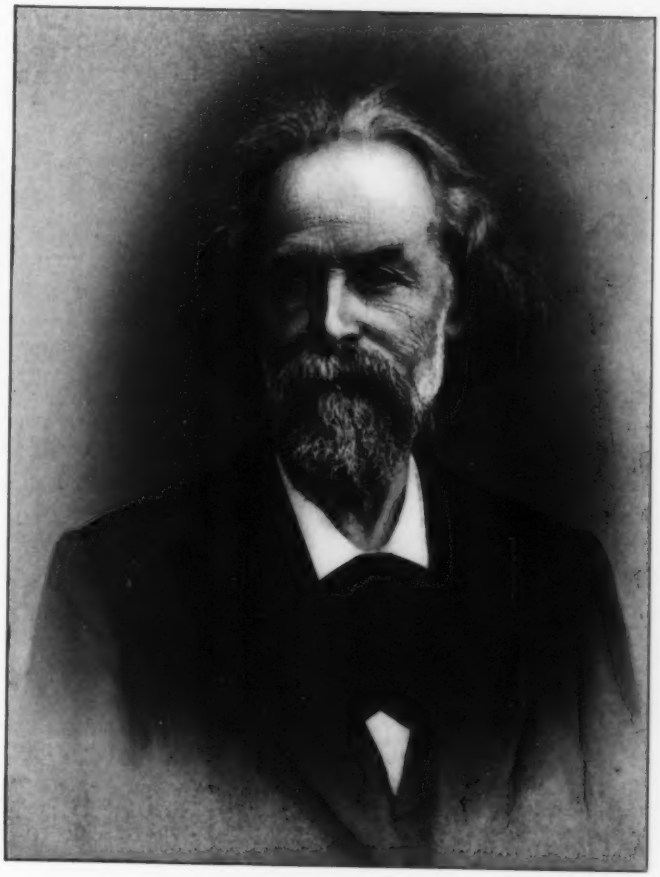
* There is no English translation of the 'Histoire d'un Ruisseau,' and of its companion book, 'Histoire d'un Montagne.'

† This work has run through five or six editions, and has been translated into all languages, including English.



Photograph by J. Thomson.

ELISÉE RECLUS.

attention to geotectonic and geological hypotheses as is required for the comprehension of the Earth as a living planet; and he excels especially in the treatment of the slow modifications of the surface (perhaps without reaching the concreteness of the illustrations which we find in Lyell's 'Principles of Geology'), and in the description of the aspects which the Earth's surface offers now to its human inhabitants. Altogether, there is no better guide for one who wishes to be familiar with physical geography (or physiography) than these two volumes. None could, at the same time, be a better source of inspiration of love of the subject, as well as love for Nature in general. The numerous small maps in the text add immensely to the suggestiveness of the book, while its style is such that it reads as a work of art.*

When the Franco-German war broke out in 1870, and Paris was besieged, Reclus joined the National Guard, attaching himself to the battalion of aëronauts which had been formed by his great friend, the photographer Nadar, and he aided him in that remarkable organization of the pigeon-post and the ballooning which kept the besieged capital in regular intercourse with the provinces unoccupied by the Germans.

Later on came the Commune of Paris, and Elisée Reclus, refusing, in accordance with his opinions, any place in the Government of the Commune, went as a soldier in the ranks of one of the battalions of the *fédérés*. On April 5, 1871, he took part in a sortie towards Versailles, and, after the defeat of the column, was made prisoner on the plateau of Chatillon. He lived through all the horrors of the Satory camp and the pontoons of Brest, and was considered as irretrievably lost after the terrible experience of the transport of the prisoners to Brest, which resulted in the loss of reason and life for so many of his companions. However, he soon recovered, and founded a school for his working-men comrades in the prison of Quelern, teaching them reading, geography, and English.

In November, 1871, he was condemned by a Council of War to transportation, but was released in the following January, after a representation in his favour had been made by scientific men of different nationalities, especially English—Darwin, A. R. Wallace, Carpenter, and many others having signed the petition. His condemnation was commuted to perpetual banishment.

After his release, Elisée Reclus went to Zürich to rejoin his brother Elie; then he stayed for a time at Lugano, and finally settled at Clarens. The first work he wrote in Switzerland was another admirable little book, 'Histoire d'une Montagne'—a companion volume to his 'Histoire d'un Ruisseau'—in which he expressed his gratitude to the beautiful Nature of the Swiss mountains for healing the deep wounds which his mind had received during the civil war.

Soon after that he undertook his main work, the 'Géographie Universelle: la Terre et les Hommes,' of which the first volume began to appear in weekly parts in 1876. Beginning with Greece as the cradle of our present European civilization, and treating in succession from east to west the European peninsulas of the Mediterranean, Reclus described next France, then Central Europe, North-Western Europe (Belgium, Holland, and these isles), the Scandinavian lands, and European Russia. Europe took thus five volumes. The next five volumes were given to Asia, Russia in Asia, Japan and China, Farther India, British India, and South-Western Asia. One volume was given to Australia and the Pacific islands, four to Africa, and the last four to the two Americas.

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* Elisée Reclus had himself written condensations of 'The Earth' in two small 18mo volumes, published at the low price of one franc each. These, again, have not been translated into English.

For nineteen years in succession Reclus brought out with astonishing regularity these bulky volumes, and there was not one single week in which the part which was due did not appear. The immensity of labour accomplished by Reclus during these years is alone a matter of wonder, the more so as he found also time to travel, and visited during that time several of the countries with which he was dealing. The amount of work which he was performing every day was colossal. Each volume of his work covered from 800 to 900 large octavo pages, and contained from 200 to 230 small maps in the text, and for each of these volumes Reclus consulted an average of 900 to 1000 volumes. Very often a volume was read and annotated, only to add a few words to the description of a valley or a mountain pass, or to choose a more characteristic adjective in the description of a range of mountains. As soon as one volume was out Reclus immediately began the next one, and by the middle of the year the fundamental manuscript, which usually represented one-half, or maybe less, of the final text, was ready. It contained the framework of the volume. All main lines, all generalizations were established. All the characteristic features of a given region were recorded in the proper terms. Its general structure, its mountains, and the characteristics of each river-basin, with its populations, industries, roads, and cities, or its successions of lacustrine basins and the wild tribes inhabiting their banks, were traced in broad, characteristic, well-chosen traits in this first manuscript. Then came the filling up of this framework with details: the beauties of hill and dale in this spot, the work of erosion of such a river, or the action of the sea on this part of the coast, the more detailed characteristics of the different stocks of which all great nations are composed, the conquests or devastations of civilization, the interesting features of such a city, or of the roads connecting them—all these were introduced, giving more and more life to the broadly painted landscape. When one remembers that every line of the manuscript, as well as of the just-mentioned details, and of the corrections in the countless proofs which used to pass between the printers and the author were made in Elisée Reclus's own handwriting, one understands vaguely the immensity of the work. And while one sees that the framework has been constructed with all the powers of a great geographer, who holds all the features of the continent which he describes in his brain and imagination, trained by travel, colossal reading, and previous work, one also realizes that the details are often true jewels set into the main picture. The result was that two distinctive features of the 'Géographie Universelle' struck all those who have written about it,—the generalizing power of a geographical genius, and the richness of admirably told, characteristic details which reveal a true poet's capacity for understanding Nature.

Before the 'Universal Geography' had been written, the description of the different portions of the globe was very unequal. For different regions we had no general geographical sketch, and knew only the results of local explorations of certain parts of the region. But Reclus so well managed to utilize all the available materials that he gave us full harmonic pictures of the whole, and that, as has been remarked once in *Petermanns Mitteilungen* (Bd. 40, litt., p. 132), the mosaic character of the preparatory work had disappeared.

It is especially in the description of rivers and their drainage areas that Elisée Reclus excelled. Taking any of the great streams—the Volga, the Niger, or the Amazonas—we find the same method applied with full success. From the very first lines the reader obtains a general idea of the position and shape of the river and its basin. Then he sees the birth of the river with the wild mountains or marshy plateau round its cradle, and the more or less wild tribes which are dwelling, or used to dwell formerly, round its headwaters. Then we are told how the upper

course of the river became the seat of small barbarian republics or monarchies, and how, finally, a powerful state grew up on its banks, concentrating several territories under its rule. The river is living in the legends of its present inhabitants, or in the hypotheses of the early geographers, or in the early historical records. And then, as we follow Reclus in his course down the river, we see the stream growing, we learn about the different civilizations that appeared or are appearing now on its banks, and we see the growing intercourse that is maintained now with other nations coming to its mouth. In short, we obtain a real living picture of a wide territory.

As to the style of Elisée Reclus, it bears distinct traces of the influence of both Karl Ritter and Alexander Humboldt, with a light veil of the poetical, imaginative mind of Southern France. All through that immense work the style conveys the impression of an intense energy of both feeling and thought. It is the comprehension of Nature of Goethe and of Shelley in his softest, less tumultuous strophes.*

Another distinctive feature of Reclus's 'Geography' is his profound respect for every nationality, stem, or tribe, civilized or not. Not only is his work free from absurd national conceit, or of national or racial prejudice; he has succeeded, besides, in indicating in every branch, stem, or tribe of the human race those features which make one feel what all men have in common—what unites, not what divides them. However, it must not be believed that such a broadly humane attitude led the writer to obliterate the racial or national peculiarities. Not only every European or Asiatic nation appears with its truly national characteristics, but even the smallest of the hundreds of tribes described appears with its own tribal character. This is so much so that one cannot but wonder how Elisée Reclus succeeded in describing so many tribes without repeating himself.

It must also be said that the human inhabitants of the globe are what interested Reclus most, much more than the animals and the plants, or the flora and fauna of past ages. The Earth as the abode of man, and what man has done and is doing of his abode, this is what absorbed his main attention.

The last volume of the 'Universal Geography' appeared in 1894, and by now, several parts of it have already had to be revised in order to follow the rapid developments of geography, anthropogeography, and demography. The volume dealing with France was entirely revised, and several others ('Russia' in the number) underwent partial revision. Besides, South Africa and China were completely brought up to date by Elisée Reclus and his brother Onésime, and were published separately with a few of the small maps.†

The 'Universal Geography' placed Reclus in the foremost rank of modern geographers, and the Royal Geographical Society awarded to him in 1894 its Royal Gold Medal.

As soon as Reclus had terminated his great work, he began to prepare a new one, in which the development of Man was to be traced in close dependency on his geographical environment.

"Man, like the Earth, has his laws," Reclus wrote in the "Parting Words," with which he concluded his 'Geography.'

"Seen from above and from afar, the diversity of features intermingled on the surface of the globe—crests and valleys, meandering waters, shore-lines, heights and

* In dealing with the 'Géographie Universelle,' I of course refer to the French edition; naturally much is lost of Reclus's delicate treatment even in the best translation.

† 'L'Afrique Australe,' small 4to, pp. 358, 1901; and 'L'Empire du Milieu,' small 4to, pp. 667, 1902.

depths, superimposed rocks—presents an image which, so far from being chaotic, reveals to him who understands a marvellous picture of harmony and beauty. . . . And if the earth seems consistent and simple amid the endless complexity of its forms, shall the indwelling humanity, as is often said, be nought but a blind chaotic mass, heaving at hazard, aimless, without an attainable ideal, unconscious of its very destiny? Migrations in diverse directions, settlements and dispersions, growth and decline of nations, civilizations and decadence, formation and displacement of vital centres; are all these, as might seem at the first glance, mere facts, nay, facts unconnected in time, facts whose endless play is uncontrolled by any rhythmical movement giving them a general tendency, which may be expressed by a law? That it is that it concerns us to know. Is the evolution of man in perfect harmony with the laws of the Earth? How is he modified under the thousand influences of the modifying environment? Are the vibrations simultaneous, and do they incessantly modulate their tones from age to age?

"Possibly the little already known may enable us to see further into the darkness of the future, and to assist us at events which are not yet. Possibly we may succeed in contemplating in thought the spectacle of human history beyond the evil days of strife and ignorance, and thus again behold the picture of grandeur and beauty already unfolded by the Earth.

"Here is what I would fain study according to the measure of my strength."

This new work Elisée Reclus completed in three large volumes, and it has begun to be published at Paris, by the Librarie Universelle, under the title, 'L'Homme et la Terre.' Only the first three parts (twelve facsimiles) are now out; but several chapters have previously appeared as separate articles in various reviews, and it is already possible to say that this new work will be an important contribution to that branch of Earth knowledge which is known as historical geography. The first chapters, dealing with primitive man, and next with the relations that existed between man and different animals which he has domesticated or used for the purposes of hunt, are already full of interest, and show already the advantages of Reclus's method. But the chapters of modern geographical history,—such as, for instance, "The Partition of China," published in the *Atlantic Monthly* in November, 1898, or various chapters of general interest published in the French reviews, *Societé Nouvelle* and *Humanité Nouvelle*, entitle us to think that we shall have in the new three volumes an extremely valuable acquisition. Nobody but the author of the 'Universal Geography' was able to so deeply analyze the international problems arising from modern colonization, and the rivalries between the industrial nations for getting hold of new markets.

In the year 1892 Elisée Reclus, dissatisfied with the turn that affairs were taking in France, left Paris, where he was staying then, and settled at Brussels. There he devoted his energy to three different undertakings. One of them was the "Université Nouvelle"—a free university which he founded with the aid of a few collaborators, and in which he himself taught geography, while his brother Elie delivered a remarkable course of a hundred lectures on the origin and history of religions. Many men of mark joined this university, which probably would have taken a further extension were it not for the difficulty offered by the small comparative value of the degrees conferred by the Université Libre, so long as they were not recognized by the State as equal to the degrees conferred by the other Belgian universities. The École des Hautes Etudes of the Université Nouvelle continued, nevertheless, to accomplish good work.

The other preoccupation of Reclus was the construction of a globe on the linear scale of 1 : 1,000,000, and, as a step to it, the preparation of convex maps with a true representation of the orography. It is known that this idea is being worked at now by many geographers, and Elisée Reclus gave to it a great deal of his activity. He came over to London a few years ago, in order to speak before the Royal Geographical Society upon this subject. In connection with this work

Reclus established at Brussels a Geographical Institute. The idea of it was to create an institution which, like the great Gotha Institute, would collect cartographic and geographical information, publish geographical works of universal utility, and undertake to accomplish geographical works for private persons, public bodies, and States. And finally, Reclus worked at the above-mentioned great work, 'L'homme et la terre.'

Elisée Reclus terminated this work last summer, and—as if his overstrained energy had been sustained only by the great problem he had before his eyes—he began to suffer from repeated and strong attacks of heart disease. The first attack of *angina pectoris* he had had already in 1880, but they seemed to have left no traces, and for a number of years they did not return. Now, and especially after the death of his brother Elie, which took place at Brussels at the end of January, 1904, the attacks of the heart became more and more frequent and extremely painful. I went to see him last June at Brussels, and found him suffering very much during such attacks, but full of mental energy a few hours later. It was hoped by his family and friends that he might still recover, but in June last the disease and suffering became more and more acute. He retained, however, full lucidity of mind, and as late as Saturday, July 1, he dictated some notes for his work. In the morning of July 4 he breathed his last, enjoining that no sort of public demonstration be made at his burial, and that nobody but his nephew, Paul Reclus (son of Elie) should accompany his body to the cemetery. He was buried in accordance with his wish, and laid by the side of his brother Elie.

Elisée Reclus leaves behind him his aged widow, a daughter married in Algeria, and several grandchildren. He was married three times. The first time he married a Creole lady, by whom he had two daughters; one of them died not long ago. He knew in perfection what Victor Hugo described as *l'art d'être grandpère*. His first wife died a few years before the Franco-German war, and he married once more, but soon lost his wife, in 1874, at Lugano. He married for a third time in Switzerland, and his wife—a good botanist and entomologist—always accompanied him during the journeys which he made while he was writing the 'Universal Geography,' and fully understood the importance to science of the great work to which her husband was giving his life.

If Elisée Reclus was held in high esteem as a geographer, he was perhaps esteemed even more as a man by the immense numbers of persons of all nations who had known him. It was impossible to approach Elisée Reclus without feeling the elevating influence of his character—such is the unanimous verdict of those who knew him. The profound scientific honesty of his work was only a reflection of his high personal integrity, absolute disinterestedness, and unlimited love of truth, without any restriction, mental or otherwise, that had become his intimate nature. The sobriety of his life was marvellous. Bread and some fruit was all that he lived upon, even when he worked from six in the morning till eleven in the evening. It was also his favourite food. Apart from the need of warmth that he began to feel as he grew in age, he may be said to have had no wants. He knew how to die poor after having written wonderful books. And he knew how, having attained the high summits of fame, never to rule anybody and to remain the equal of his humblest collaborator and of every one he met with. He certainly was one of the finest specimens of civilized mankind, a man *free* in the purest sense of the word.

P. Kropotkin.

CORRESPONDENCE.

Railways in China.

Chatham, August 13, 1905.

HAVING had a certain amount of experience in railway reconnaissance work in China, perhaps I might be allowed to add a word on the subject to Major Davies's letter in the August *Journal*. Sir George Scott's remarks struck me as being very much to the point.

Railway location in unknown countries (and in known ones also) is only too often carried out in a very unsatisfactory manner. The correct method of doing it cannot be dealt with here, but the reconnaissance, if properly carried out by an expert in such work, is of the greatest importance and the most difficult part of the work. If carried out in the more usual way, it is a very expensive method of acquiring information and locating a railway.

Some people seem to imagine that by following a track through a country, and making a rough sketch as they go, they are surveying that country and carrying out a railway reconnaissance.

I have, unfortunately, had experience with the results of such work, and found the so-called "maps" quite useless and the reports misleading and sometimes entirely wrong. The money spent on such work is mostly thrown away, as also the larger sums spent on operations based on the supposed results of such work. I am afraid these remarks apply to a great deal of the reconnaissance work that has been carried out in China. In locating a railway maps are of assistance, but a railway can very seldom be located from a map, though its probable general direction might be indicated.

The object of the sketch-map made whilst reconnoitring for a railway is mostly to illustrate the report and make it clearer. It is useless for determining the cost of a railway, and it is only cost which decides whether a route is practicable or impracticable, as a railway can be built anywhere with sufficient time and money.

By "cost" is meant the combined cost of constructing and operating, the latter being just as important as the former.

E. BARNARDISTON, Captain R.E.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C. R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological, etc.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alps. *Rev. G.* **29** (1905): 103–108. **Letorey.**

Le glacier de Tête-Rousse. Par R. Letorey. *With Map and Illustrations.*

Alps. *J. Geology* **13** (1905): 1–19. **Penck.**

Glacial features in the surface of the Alps. By A. Penck.

Summarizes some of the conclusions reached in 'Die Alpen im Eiszeitalter.'

Alps. **Penck and Brückner.**

Die Alpen im Eiszeitalter. Von Dr. A. Penck und Dr. E. Brückner. Lieferung 7. Leipzig: C. H. Tauchnitz, 1905. Size 10½ × 7½, pp. 657–784. *Maps and Illustrations. Presented by the Publisher.*

Alps. **Coolidge, Duhamel, and Perrin.**

Conway and Coolidge's Climbers' Guides. The Central Alps of the Dauphiny. By W. A. B. Coolidge, H. Duhamel, and F. Perrin. Second edition. London: T. Fisher Unwin, 1905. Size 6½ × 4½, pp. xiv. and 220. *Price 7s. 6d. net. Presented by the Publisher.*

This edition has been carefully revised and the information brought up to the end of 1904. Consistently with its destination for climbers only, the sections on routes of approach, and on inns, etc., have been omitted.

Alps. **Whymper.**

The Valley of Zermatt and the Matterhorn. A Guide by Edward Whymper. 9th edition, pp. xxv. and 224. Chamonix and the Range of Mont Blanc. By the same. 10th edition. Size 7½ × 5, pp. xiv. and 206. *Maps and Illustrations. Two copies of each, presented by the Author and Publisher.*

Alps—Geology. *C. Rd.* **140** (1905): 1072–1073. **Sandberg.**

Sur l'âge du granite des Alpes occidentales et l'origine des blocs exotiques cristallins des Klippes. Note de C. G. S. Sandberg.

Alps—Simplon. *P.R.S.*, Ser. A., **76** (1905): 29–33. **Fox.**

The Boring of the Simplon Tunnel, and the Distribution of Temperature that was encountered. By F. Fox. *With Section.*

See note in the Monthly Record (August, p. 214).

Alps—Simplon. *La G., B.S.G. Paris* **11** (1905): 81–96. **Schardt.**

Les eaux souterraines du tunnel du Simplon. Par H. Schardt. *With Illustrations.*

Noticed in the June number (p. 672).

Alps—Simplon. *Globus* **87** (1905): 197–198. ——

Der Durchstich des Simplon. *With Sections.*

Austria. *G. Abh.* **8**, Heft 3 (1905): pp. 206. **Hassinger.**

Geomorphologische Studien aus dem inneralpinen Wiener Becken und seinem Randgebirge. Von Dr. H. Hassinger. *With Sections.*

Austria—Bosnia. *Abrégé B.S. Hongroise G.* **30** (1902): 70–82. **Thallóczy.**

Bosnien als historischer Schauplatz. Gestalt, Grenzen, geologische, hydrographische und geographische Verhältnisse. Tier- und Pflanzenwelt. (*Földrajzi Közlemények* **30** (1902): 210–238.)

Austria—Geodesy. ——

Die Ergebnisse der Triangulierungen des K. u. K. Militär-Geographischen Institutes. 3 vols. Wien, 1901–1905. Size 11 × 8, pp. (vol. 1) x. and 218; (vol. 2) viii. and 172; (vol. 3) viii. and 274. *Maps. Presented by the K. u. K. Militärgeographisches Institut.*

Austria—Herzegovina. *Petermanns M.* **51** (1905): 76–81. **Daneš and Thon.**

Die westhercegovinische Kryptodepression. Reisebericht von Dr. J. V. Daneš und Dr. K. Thon. *Also separate copy.*

Bulgaria. *Petermanns M.* **51** (1905): 69–70. **Ischirkoff.**

Die hypsometrischen Verhältnisse des Fürstentums Bulgarien. Von Prof. Dr. A. Ischirkoff.

Central Europe—Communications. *Petermanns M.* **51** (1905): 65–66. **Held.**
Die Verkehrsgürtel von Berlin und Wien. Von Prof. F. Held. *With Maps.*
Shows the greater width of the isochronic zones for Berlin than for Vienna, largely owing to physical factors.

Central Europe—Communications. *G.Z.* **11** (1905): 85–99, 145–162. **Müller.**
Das spätmittelalterliche Strassen- und Transportwesen der Schweiz und Tirols. Eine geographische Parallele. Von Dr. J. Müller.

Central Europe—Jura. *Spelunca* **5** (No. 40) (1905): pp. 26. **Fournier.**
Recherches spéléologiques dans la chaine du Jura. Par E. Fournier. 6e Campagne 1903–1904. *With Plans and Illustrations.*

Central Europe—Jura. *La G., B.S.G. Paris* **11** (1905): 108–112. **Offner.**
La végétation des lacs du Jura d'après M. Ant. Magnin. Par Dr. J. Offner. *With Illustrations.*

Central Europe—Rivers. *M.G. Ges. München* **1** (1905): 309–310. **Ule.**
Der Wasserhaushalt in den Strömen Mitteleuropas. Von Prof. Dr. W. Ule.

Denmark—Historical. *Aarb. Nord. Oldk. Hist.* **19** (1904): 1–64. **Müller.**
Vei og Bygd i Sten- og Bronzealderen. Af S. Müller. *With Maps and Illustrations.*
On traces of ancient roads and settlements.

Europe—Ethnology. *J. Anthrop. I.* **34** (1904): 181–206. **Deniker.**
Les six races composant la population actuelle de l'Europe. Par le Dr. J. Deniker. *With Maps and Illustrations.*

Færoes. **Børgesen.**
Om Algevegetationen ved Færøernes Kyster. En plantegeografisk undersøgelse. Af F. Børgensen. København og Kristiania: Gyldendalske Boghandel, 1904. Size 10½ × 7, pp. 122. *Map and Plates. Presented by the Author.*

Færoes and Iceland. **Annandale.**
The Færoes and Iceland: Studies in Island Life. By N. Annandale. With an Appendix on the Celtic Pony by F. H. A. Marshall, D.Sc. Oxford: Clarendon Press, 1905. Size 8 × 5½, pp. viii. and 238. *Illustrations. Price* 4*s.* 6*d. net. Presented by the Publishers.*
Interesting studies made during holiday visits to the islands. It is especially the life of the people that is referred to, but there is a chapter on the bird-cliffs of the Westman isles, and an appendix on the Celtic pony. The ravages of the Turkish pirates from Algeria in the seventeenth century form the subject of a special chapter.

France. **Beyle and Chaytor.**
'Mémoires d'un Touriste' by Stendhal (Henri Beyle). Edited by H. J. Chaytor. (Oxford Modern French Series.) Oxford: Clarendon Press, 1905. Size 7½ × 5, pp. xii. and 104. *Map and Illustrations. Price* 2*s. Presented by the Publishers.*
Another of the excellent series of French readers, in which Taine's 'Voyage aux Pyrénées' had previously appeared.

France. *B.S.G. Lille* **43** (1905): 274–301. **Merchier.**
L'Ardenne française, Meuse et Semoy. Par A. Merchier. *With Illustrations.*

France. *B.S.G. Rochefort* **27** (1905): 46–48. **Pawlowski.**
L'orcanie géologique et historique. Par A. Pawlowski.
Orcanie is the name for a submarine plateau near the Isle de Ré.

France—Alps. *La G., B.S.G. Paris* **11** (1905): 328–330. **Martel.**
L'oucane de Chabrières (Hautes-Alpes). Par M. E. A. Martel.

France—Causses. *B.S.G. Com. Bordeaux* **31** (1905): 41–54. **Buffault.**
Le Reboisement des Causses. Par P. Buffault.
While recognizing that the restoration of the old forests that once covered the Causses is impossible, the author thinks that a partial reforestation would be both feasible and beneficial.

France—Puy-de-Dôme. *La G., B.S.G. Paris* **11** (1905): 293–301. **Baldit.**
La sécheresse de l'été et de l'automne 1904 dans la région du Puy-de-Dôme. Par A. Baldit. *With Map.*

France—River-captures. *C. Rd.* **140** (1905): 745–748. **Fournier.**
Sur des phénomènes de capture de cours d'eau datant du XVII^e^, du XVIII^e^ et du début du XIX^e^ siècle, prouvés par des documents cartographiques. Note de E. Fournier.
Noticed in the Monthly Record (August, p. 213).

France—Vienne. *Ann. G.* **14** (1905): 111–117. **Blayac and Vacher.**
La vallée de la Vienne et le coude d'Exideuil. Par J. Blayac et A. Vacher. *With Map.*
See note at p. 213, *ante*.

Germany—Coast-changes. *Petermanns M.* **51** (1905): 73–76. **Hansen.**
Küstenänderungen in Süderdithmarschen im 19. Jahrhundert. Von Prof. Dr. R. Hansen. *With Maps.*

Germany—Population. *Ann. G.* **14** (1905): 118–125. **Auerbach.**
La population de l'Empire Allemand d'après le recensement de 1900. Phénomènes démographiques et Industrie. Statistique confessionnelle et Linguistique. Par B. Auerbach.

Germany—Prussia—Statistics. **Blenck.**
Festschrift des Königlich Preussischen Statistischen Bureaus zur Jahrhundertfeier seines Bestehens. 3 vols. (1 and 2 in one vol.) Erster Teil: Das Königliche Statistische Bureau im ersten Jahrhundert seines Bestehens 1805 bis 1905. Herausgegeben von E. Blenck. Pp. xii. and 272. Zweiter Teil: Tabellen und Uebersichten zum Statistischen Atlas für den Preussischen Staat. Pp. viii. and 152. Dritter Teil: Statistischer Atlas für den Preussischen Staat. 8 pp. and 116 plates. Berlin, 1905. Size 13 × 9½. *Presented by the Bureau.*
A valuable and comprehensive summary of the statistics of the kingdom of Prussia in the form of tables, maps, and diagrams. It would have been instructive if geological and hypsometrical maps had been added, to facilitate correlation of the statistical data with physical factors.

Germany—Saxony. **Proot.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **22** (1905): 476–494.
Het Elbe-Zandsteengebergte. Door Mej. J. M. Proot. *With Illustrations.*

Germany—Weser. *M.K.K.G. Ges. Wien* **48** (1905): 123–132. **Schucht.**
Das Mündungsgebiet der Weser zur Zeit der Antoniflut (1511). Von Dr. F. Schucht. *With Map.*
Noticed in the July number (p. 85).

Greece—Eubœa. *Ann. G.* **14** (1905): 126–143. **Deprat.**
Esquisse de la géographie physique de l'île d'Eubée dans ses relations avec la structure géologique. Par J. F. Deprat. *With Illustrations.*

Hungary—Emigration. *Abrégé B.S. Hongroise G.* **30** (1902): 17–45. **Thirring.**
Die Auswanderung aus Ungarn. Von Dr. G. Thirring. *Maps and Diagrams.*
See *Journal*, vol. **24**, p. 586.

Hungary—Waterways. *Abrégé B.S. Hongroise G.* **30** (1902): 46–56. **Gerster.**
Die Wasserstrassen Ungarns. Von B. Gerster. (*Földrajzi Közlemények* **30** (1902): 253–264.)

Iceland. *Petermanns M.* **51** (1905): 49–53. **Thoroddsen.**
Die Bruchlinien Islands und ihre Beziehungen zu den Vulkanen. Von Prof. Dr. T. Thoroddsen. *With Maps.*

Iceland—Meteorology. *J. Scottish Meteorolog. S.* **13** (1905): 33–37. **Muir.**
Notes on the Weather on the Vatna Jökull during August and September, 1904. By T. S. Muir.

Iceland—Survey. *G. Tidskrift* **18** (1905–6): 1–14. **Koch.**
Fra Generalstabens topografiske Afdelings Virksomhed paa Island. Ved Premierløjtnant J. P. Koch. *With Map.*

Italy. *A travers le Monde* **11** (1905): 145–148. **Maumené.**
Les Villages pélasgiques des monts des Volsques. Par C. Maumené. *With Illustrations.*

Italy—Friuli. *B.S.G. Italiana* **6** (1905): 36–38. **Bertolini.**

Di una misura derivata dalla particolare condizione del suolo. Nota del Prof. G. L. Bertolini.

The measure spoken of is the "falce," used as a unit in specifying the right of cutting hay in the communal lands of Friuli

Italy—Sardinia. **Merlo.**

G. Merlo. L'Iglesiente propriamente detto e la sua costituzione geologica. (Estratto dalla *Rassegna Mineraria*, vol. **21**, nn. 5, 6, e 7: 11 e 21 agosto e 1° settembre 1904.) Torino, 1904. Size 9½ × 6½, pp. 36. *Map. Presented by the Author.*

Italy—Silk. **Chapman.**

Silk Trade and yield of cocoons in Italy in 1904. Foreign Office, Miscellaneous, No. 632, 1905. Size 10 × 6½, pp. 10. *Price* 1*d.*

Norway. *La G., B.S.G. Paris* **11** (1905): 115–121. **Rabot.**

Exploration géologique du Jotunheim. Par C. Rabot. *With Illustrations.*

Norway. *La G., B.S.G. Paris* **11** (1905): 113–115. **Rabot.**

L'éboulement du Ravnefjeld. Par C. Rabot. *With Sketch-map.*

Norway—Cartography. *Petermanns M.* **51** (1905): 58–62. **Nissen.**

Die Kartographie Norwegens. Eine kurze Uebersicht. Von P. Nissen.

Pyrenees. **Taine and Robertson.**

Voyage aux Pyrénées, by H. Taine. Edited by W. Robertson. Oxford: Clarendon Press, 1905. Size 7½ × 5½, pp. xvi. and 212. *Map. Price* 2*s.* 6*d. Presented by the Publishers.*

One of an excellent series of French reading-books designed with a view to the gaining a knowledge of French nineteenth-century literature. The introduction gives a sketch of Taine's life and of the circumstances in which the present work (the outcome of a commission to write a guide-book to the Pyrenees) came to be written.

Russia. *Deutsch. Rundschau G.* **27** (1905): 259–269, 308–319. **Olinda.**

Das heutige Livland. Von Dr. A. Olinda. *With Illustrations.*

Spain—Pyrenees. *B.R.S.G. Madrid* **47** (1905): 79–92. **Briet.**

El Paso de las Devotas en los Pirineos españoles. Por L. Briet. *With Illustrations.*

Spain—Valencia. *B.R.S.G. Madrid* **47** (1905): 93–157. **Soler y Pérez.**

Por el Júcar. Por E. Soler y Peréz. *With Map and Illustrations.*

A study of the geography of a district in the west of the province of Valencia.

Sweden. *Ymer* **25** (1905): 17–35. **Ahlenius.**

Bidrag till Siljansbäckenets geografi. Af K. Ahlenius. *With Maps and Illustrations.*

Sweden. *La G., B.S.G. Paris* **11** (1905): 359–367. **Rabot.**

La distribution de la population en Suède en fonction de la constitution géologique du sol. Par C. Rabot. *With Map and Illustrations.*

Based chiefly on papers in *Ymer* (cf. *Journal*, vol. **25**, p. 453).

Sweden—Geological history. **Post.**

Sveriges Geolog. Undersök., Ser. C., No. 195 (1903): pp. 36.

En profil genom högsta Litorinavallen på södra Gotland. Af L. von Post. *With Map and Illustrations.*

Switzerland. **Baedeker.**

Switzerland and the adjacent portions of Italy, Savoy, and Tyrol. Handbook for Travellers by Karl Baedeker. 21st edition. Leipsic: K. Baedeker; London: Dulau & Co. 1905. Size 6½ × 4, pp. xxxviii. and 548. *Maps, Plans, and Panoramas. Price* 8 *marks. Two copies, presented by the Editor and Publishers.*

Switzerland. *La G., B.S.G. Paris* **11** (1905): 212–216. **Bonaparte.**

L'influence de l'exposition sur le site des villages dans le Valais. Par Prince Roland Bonaparte. *With Illustrations.*

Switzerland. **Groll.**

Der Oeschinensee im Berner Oberland. Von Max Groll. Bern, 1904. Size 9 × 6½, pp. vi. and 78. *Maps and Illustrations. Presented by the Author.*

Switzerland. *M.G. Ges. München* 1 (1905): 303–305. **Kittler.**

Den Einfluss der Alpenpässe auf die Entstehung der Eidgenossenschaft. Von Dr. C. Kittler.

Switzerland—Geographical Dictionary. **Knapp, Borel, and Attinger.**

Geographisches Lexikon der Schweiz . . . herausgegeben unter der leitung von C. Knapp, M. Borel und V. Attinger. Deutsche Ausgabe besorgt von H. Brunner. Dritter Band. Krailigen-Plentsch. Neuenburg: Gebrüder Attinger, 1905. Size 11 × 7½, pp. viii. and 768. *Maps and Illustrations. Presented by Dr. H. Brunner.*

ASIA.

Caspian Sea. *Ymer* 25 (1905): 36–75. **Falk.**

Om utvecklingen af kännedomen om Kaspiska hafvet. Af A. Falk.

Central Asia—Tian Shan. *Sitzb. K.B.A.W. München* (1904): 277–369. **Merzbacher.**

Forschungsreise im Tian-Schan. Von G. Merzbacher.

Ceylon. **Dunstan.**

Ceylon. Reports on the Results of the Mineral Survey in 1903–4. By Prof. W. R. Dunstan, F.R.S., etc. Colonial Reports, Miscellaneous, No. 29. 1905. Size 10 × 6, pp. 34. *Price* 2½*d.*

Noticed in the Monthly Record (August, p. 215).

China. **Genschow.**

Unter Chinesen und Tibetanern. Von A. Genschow. Rostock i. M.; C. J. E. Volckmann, 1905. Size 10 × 6½, pp. vi. and 384. *Maps and Illustrations. Price* 6*s.*

See p. 323, *ante.*

China. *B. Économique (Indo-Chine)* 7 (1904): 1283–1294. **Liébert and Brenier.**

Les ports et escales du Delta cantonais. Par G. Liébert. Note complémentaire, par H. Brenier. *With Map.*

China. *J.G., Tōkyō G.S.* 16 (1904): 422–435, 482–490. **Yamada.**

Travel to Yunnan, Sz'-tchuen and Kweichau Provinces. By K. Yamada. [In Japanese.] *With Illustrations.*

China and Tibet. *La G., B.S.G. Paris* 11 (1905): 285–292. **Grillières.**

Voyage au Yun-nan et au Thibet oriental. Par G. Grillières.

Chinese Empire—Tibet. *Periodical Accounts Moravian Missions* 6 (1905): 5–23. **Davey.**

The Buddhism of Tibet—a sketch. By J. W. Davey. *With Illustrations.*

Eastern Asia. **Franke.**

Was lehrt uns die ostasiatische Geschichte der letzten fünfzig Jahre? Vortrag von Dr. O. Franke. (Abteilung Berlin-Charlottenburg der Deutschen Kolonial-Gesellschaft, Verhandlungen 1903–5. Band viii. Heft 4.) Berlin: D. Reimer, 1905. Size 9 × 6, pp. 91–114. *Price* 60 *pfg. Presented by the Publisher.*

India—Assam. *T. Liverpool G.S.* (1904): 40–41. **Hodson.**

The Assam Hills. By T. C. Hodson. *With Plan.*

India—Assam. *Records Geolog. Surv. India* 31 (1904): 179–204, 205–232. **Maclaren.**

The Geology of Upper Assam. By J. M. Maclaren.

The Auriferous Occurrences of Assam. By the same.

India—Burma. **Wehrli.**

Beitrag zur Ethnologie der Chingpaw (Kachin) von Ober-Burma. Von Dr. H. J. Wehrli. (Supplement zu Bd. xvi. von "Internationales Archiv für Ethnographie.") Leiden: E. J. Brill, 1904. Size 13 × 10, pp. xvi. and 84. *Map and Plates. Price* 9*s.* 6*d.*

India—Burma. ———

The Burma Route Book. Part ii. Routes in North-Eastern Burma. Compiled in the Intelligence Branch, Quartermaster-General's Department in India. 1903. Calcutta, 1905. Size 13½ × 8½, pp. iv. and 304. *Map. Presented by the Intelligence Branch, Simla.*

India—Himalayas. *Alpine J.* 22 (1905): 348–352. **Neve.**

Nun Kun revisited. By Dr. A. Neve. *With Illustrations.*

Dr. Neve's former paper was noticed in the *Journal* in 1903 (vol. 21, pp. 671).

India—Historical. *Z. Deutsch. Morgenländ. Ges.* 58 (1904): 787–796. **Smith.**

The Indian Kings named Śīlāditya, and the Kingdom of Mo-la-p'o. By V. A. Smith. *With Map.*

India—Historical. **Bowrey.**

A Geographical Account of the Countries round the Bay of Bengal. By Thomas Bowrey. Edited by Sir R. C. Temple. [Works issued by the Hakluyt Society. Second Series. No. xii.] Cambridge, 1905. Size 9 × 6, pp. lvi. and 388. *Facsimile Map and Illustrations. Presented by the Hakluyt Society.*

Printed from a hitherto unpublished manuscript, which fills up a gap in the early history of the doings of the English in the East. The author, who gave his initials only, has, after much research, been satisfactorily identified as Thomas Bowrey. The work is admirably edited, all points needing elucidation having been thoroughly threshed out.

India—Madras. **Marsden.**

A Geography of the Madras Presidency adapted to the requirements of the Primary Examination. By E. Marsden. 3rd edition. London : Macmillan & Co., [*not dated*]. Size 7 × 5, pp 80. *Maps and Illustrations.*

India—Minerals. *Records Geolog. Surv. India* **32** (1905): 1–118. **Holland.**

Review of the Mineral Production of India during the years 1898 to 1903. By T. H. Holland, F.R.S. *With Map and Diagrams.*

India—Shan States. *J.S. Arts.* **53** (1905): 623–641. **Scott.**

The Prospects of the Shan States. By Sir J. G. Scott, K.C.I.E. *With Map.*

Japan. *J.G., Tōkyō G.S.* **16** (1904): 668. **Fukuchi.**

Structure of the Volcanic Island Miyakejima. By N. Fukuchi. [In Japanese.]

Japan. *J.G., Tōkyō G.S.* **16** (1904): 764–772. **Tanaka.**

On Lake Numazawa. (Limnological Researches in Japan, No. 7.) By A. Tanaka. [In Japanese.]

Japan—Population. *Questions Dipl.* **19** (1905): 539–550. **Gounard.**

Les Japonais sont-ils à l'étroit au Japon? Étude sur les conditions démographiques de l'expansion Japonaise. Par Prof. R. Gounard.

Discusses the question whether the population of Japan has outgrown the resources of the country. The answer is in the negative.

Malay Archipelago—Timor. **Bakhuis.**

Tijds. K. Ned. Aard. Genoots., Amsterdam **22** (1905): 497–499.

Bij de kaart van een deel van het eiland Timor op de schaal 1 : 500,000. Door L. A. Bakhuis. *With Map.*

Pamirs. *J.G., Tōkyō G.S.* **16** (1904): 3–10, 87–104, 289–298, 349–354, 473–481. **Ōtani.**

Travel to Pamir. By K. Ōtani. [In Japanese.] *With Map.*

Philippine Islands. **Blair and Robertson.**

The Philippine Islands, 1493–1898. Edited . . . by E. H. Blair and J. A. Robertson, with historical introduction, etc. By E. G. Bourne. Vol. **21**, 1624 (pp. 320); vol. **22**, 1625–1629 (pp. 324); vol **23**, 1629–1630 (pp. 298); vol. **24**, 1630–1634 (pp. 340); vol. **25**, 1635–1636 (pp. 322). Cleveland, Ohio: The Arthur H. Clark Co., 1905. Size 10 × 6½. *Illustrations.*

Philippine Islands. *National G. Mag.* **16** (1905): 139–192. ——

A Revelation of the Filipinos. *With Illustrations.*

Philippine Islands—Census. ——

Census of the Philippine Islands, taken under the direction of the Philippine Commission in the year 1903. 4 vols. Vol. **1**, Geography, History, and Population (pp. 620); vol. **2**, Population (pp. 1048); vol. **3**, Mortality, Defective Classes, Education, Families and Dwellings (pp. 740); vol. **4**, Agriculture, Social and Industrial Statistics (pp. 638). Washington : United States Bureau of the Census, 1905. Size 9½ × 6. *Maps and Illustrations. Presented by the Bureau of the Census, Washington.*

Forms a nearly exhaustive statistical account of the Philippines, their inhabitants, productions, etc.

Russian Central Asia. **Lipsky.**

Upper Bukhara. Results of three years' travels in Central Asia in 1896, 1897, and 1899. V. I. Lipsky. Part iii. [In Russian.] St. Petersburg, 1905. Size 11½ × 9, pp. 547–735. *Map and Illustrations.*

Russian Central Asia. *G. Tidskrift* **18** (1905–6): 69–85. **Olufsen.**

Oasen Merv. Af Premierløjtnant O. Olufsen. *With Map and Illustrations.*

South-East Asia. **Little.**

Across Yunnan and Tonking. By Archibald Little. Shanghai, 1905. Size 9½ × 6, pp. 34. *Maps.*

Describes a journey made in 1904 from Chengtu to Hanoi and Haiphong.

Straits Settlements—Penang. **Steuart.**

Imp. and Asiatic Quarterly Rev. **19** (1905): 112–123.

The Foundation of Penang—Captain Light and the Nonyah. By A. F. Steuart.

Turkey—Palestine. **Libbey and Hoskins.**

The Jordan Valley and Petra. By W. Libbey, SC.D., and F. E. Hoskins, D.D. 2 vols. New York and London: G. Putnam's Sons, 1905. Size 9 × 6, pp. (vol. 1) xvi. and 354; (vol. 2) viii. and 380. *Map and Illustrations. Presented by Dr. W. Libbey.* [To be reviewed.]

Western Asia. **Le Strange.**

The Lands of the Eastern Caliphate: Mesopotamia, Persia, and Central Asia from the Moslem Conquest to the time of Timur. By G. Le Strange. Cambridge: University Press, 1905. Size 8 × 5½, pp. xviii. and 536. *Maps. Price* 15*s. Presented by the Publishers.* [To be reviewed.]

AFRICA.

Abyssinia. *Questions Dipl.* **19** (1905): 465–477. **Caix.**

La question d'Éthiopie. Par R. de Caix.

Abyssinia. *B.S.G. Italiana* **6** (1905): 19–30. **Castro and Oddone.**

Risultati delle osservazioni meteorologiche ad Addis-Aboba ed Addis-Alem nel bacino dell' Hauash in Abissinia, compiute dal dott. Lincoln de Castro, e compilate dal dott. E. Oddone. *With Illustrations.*

Abyssinia. *B.S.G. Italiana* **6** (1905): 8–18. **Felizzano.**

Nei Paesi Galla a sud dello Scioa. Relazione di viaggio del cap. Conte G. Colli di Felizzano.

Africa—Railways. *Deutsch. Rundschau G.* **27** (1905): 299–308. **Wagner.**

Tropische Eisenbahnen. Zeitgemässe Betrachtungen von R. Wagner. *With Map and Illustrations.*

Basutoland. ———

Basutoland. Report for 1903–4, with Returns of the Census, 1904. Colonial Reports, Annual No. 444, 1905. Size 9½ × 6, pp. 64. *Price* 3*d.*

British East Africa. *J. Anthrop. I.* **34** (1904): 255–265. **Tate.**

Further notes on the Kikuyu tribe of British East Africa. By H. R. Tate. *With Illustrations.*

British East Africa. ———

Africa. No. 4 (1905). Reports from the Director of Agriculture on the Government Farms at Nairobi and Naivasha in the East Africa Protectorate for the year 1904, and on the Prospects of Settlers. London: Wyman & Sons, 1905. Size 13½ × 8½, pp. 50. *Illustrations. Price* 1*s.* 1*d.*

Noticed in the Monthly Record (August, p. 217).

Cape Colony—Census. ———

Results of a Census of the Colony of the Cape of Good Hope, as on the Night of Sunday, April 17, 1904. Cape Town, 1905. Size 13½ × 8½, pp. cxxviii. and 556. *Maps and Diagram. Presented by the Director of the Census.*

The general results of the census were noted in the *Journal* for December, 1904 (p. 679).

Central Africa. *B.S.R. Belge G.* **28** (1904): 461–482. **Flamme.**

Ethnographie congolaise. Région du lac Albert (N.-O.) et du Haut-Nil. Par Sous-lieutenant Flamme. *With Map and Illustrations.*

Central Africa—Zoology. *P. Zoolog. S.* 1904 (2) (1905): 193–199. **Thomas.**

On *Hylochœrus*, the Forest Pig of Central Africa. By O. Thomas. *With Plates.*

Congo State. **Pourbaix.**

Federation for the Defence of Belgian Interests Abroad. The Congo Free State and African Civilization. V. Pourbaix. Novembre 1904. Size 9½ × 6½, pp. 32. *Illustrations.*

East Africa. *Scottish G. Mag.* **21** (1905): 260–263. **Capenny.**
The Proposed Anglo-Abyssinian Boundary in East Africa. By S. H. F. Capenny. *With Map.*

Egypt—Irrigation. *La G., B.S.G. Paris* **11** (1905): 161–184. **Brunhes.**
L'irrigation en Égypte depuis l'achèvement du réservoir d'Assouan (1902). Par Prof. J. Brunhes. *With Map and Illustrations.*

Egypt—Meteorology. ———
The Meteorological Report for the year 1902. The Survey Department, Public Works Ministry, Cairo. Cairo, 1904. Size 7½ × 11, pp. 204. *Diagrams.*

Egypt—Suez Canal. *Abh. K.K.G. Ges. Wien* **5** (1903–4): No. 3, pp. 76. **Voss**
Der Suezkanal und seine Stellung im Weltverkehr. Von M. Voss.

Egyptian Sudan. *Blackwood's Mag.* **177** (1905): 544–554. **Balfour.**
The Waterways of the Sudan. From the Atbara to Tuti. By Dr. A. Balfour.
Sketches of life on the Nile and its tributaries.

Egyptian Sudan. *A travers le Monde* **11** (1905): 109–110. ———
Débouchés du Soudan égyptien. La Ligne de Berber-Souakim et le Port de Cheik-el-Barghoud. *With Map.*

French Congo. *La G., B.S.G. Paris* **11** (1905): 243–244. **Vaille.**
Voyage de M. Vaille dans l'Ivindo-n'Djadié. *With Map.*
See note in the July number (p. 87).

German East Africa. *Deutsch. Kolonialblatt* **16** (1905): 207–209. ———
Beobachtungen aus Deutsch-Mpororo.

Ivory Coast. *Tour du Monde* **11** (1905): 61–96. **Lamy.**
Souvenirs de la Côte d'Ivoire. Par le Docteur Lamy. *With Map and Illustrations.*

Madagascar. ———
Guide-Annuaire de Madagascar et Dépendances. Année 1905. Tananarive 1905. Size 9 × 6, pp. viii. and 800. *Maps.*

Madagascar—Surveys. *C. Rd.* **140** (1905): 1219–1222. **Colin.**
Travaux géodésiques et magnatiques aux environs de Tananarive. Note du R. P. Colin.

Morocco. *Petermanns M.* **51** (1905): 90–91. **Fischer.**
Der Djebel Hadid im südwestlichen Atlasvorland von Marokko. Von Prof. Dr. T. Fischer.

Morocco. *Rev. Française* **30** (1905): 223–236. **Segonzac.**
Maroc: La mission de Segonzac arrêtée. *With Map.*
Fuller details are given in the map accompanying M. Terrier's paper (see below).

Morocco. *Questions Dipl.* **19** (1905): 385–391. **Terrier.**
Dans le Bled Siba. La mission Segonzac. Par A. Terrier. *With Map.*
Account of exploration in the Atlas and region to the south (cf. *Journal*, vol. 25, p. 564, and *ante*, p. 333).

Morocco. **Gamazo.**
La Cuestión de Marruecos desde el punto de vista español por G. M. Gamazo. Madrid: M. Romero, 1905. Size 9 × 6, pp. viii. and 308. *Presented by the Publisher.*

Morocco. **Hübner.**
Militärische und militärgeographische Betrachtungen über Marokko. Ein Beitrag zu aktuellen Fragen. Von Max Hübner. Berlin: D. Reimer, 1905. Size 8 × 5½, pp. iv. and 100. *Maps. Price* 2 *marks. Presented by the Publisher.*
An account of the present position of the sultan's army, with a description of the country from a strategic point of view, and a discussion of the possibility of a military reorganization in the interests of the development of the country by European nations. The writer lays stress on the need of the opening of railway and other routes.

Nile Basin. **Lyons.**
The Rains of the Nile Basin in 1904. By Captain H. G. Lyons. Cairo, 1905 Size 11 × 7½, pp. 26. *Map and Diagrams*

North-East Africa. *P.R.S.*, Ser. A., **76** (1905): 66–86. **Lyons.**

On the relation between variations of atmospheric pressure in North-East Africa and the Nile Flood. By Captain H. G. Lyons. *With Diagram. Also separate copy, presented by the Author.*

Rhodesia. *Scottish G. Mag.* **21** (1905): 137–152. **Heatley.**

The Development of Rhodesia and its Railway System in relation to Oceanic Highways. By J. T. P. Heatley. *With Maps and Illustrations.*

Rhodesia. *J. African S.* **3** (1903–4): 247–256; **4** (1905): 337–345. **Melland.**

Some ethnographical notes on the Awemba tribe of North-Eastern Rhodesia (and on some portion of the Wabisa). By F. H. Melland. *With Illustrations.*

Sahara—Figig. *Ann. G.* **14** (1905): 144–166. **Gautier.**

Rapport sur une mission géologique et géographique dans la région de Figuig. Par E. F. Gautier. *With Map and Sections.*

Sahara—Geology. *C. Rd.* **140** (1905): 1200–1201. **Foureau and Genti.**

Les régions volcaniques traversées par la Mission Saharienne. Note de F Foureau et L. Gentil.

See note in the Monthly Record (August, p. 218).

Sahara—Geology. *C. Rd.* **140** (1905): 957–959. **Haug.**

Sur la présence du Carbonifère moyen et supérieur dans le Sahara. Note de E. Haug.

South Africa—Ethnology. **Stow and Theal.**

The Native Races of South Africa. A History of the Intrusion of the Hottentots and Bantu into the Hunting Grounds of the Bushmen, the Aborigines of the Country. By George W. Stow. Edited by Dr. G. M. Theal. London: Sonnenschein & Co., 1905. Size 10 × 6, pp. xvi. and 618. *Map and Plates. Price* 21*s. net. Presented by the Publisher.* [To be reviewed.]

NORTH AMERICA.

Alaska. *Ann. Rep. Dep. Interior*, 1903, *Mis. Rep.*, Pt. II.: 1–102. **Brady.**

Report of the Governor of Alaska. *With Maps.*

Alaska *National G. Mag.* **16** (1905): 104–111. **Paige.**

A growing Camp in the Tanana Gold Fields, Alaska. By S. Paige. *With Illustrations.*

America—Maps. **Winsor.**

Library of Congress. The Kohl Collection (now in the Library of Congress) of Maps relating to America. By Justin Winsor. A Reprint of Bibliographical Contribution Number 19 of the Library of Harvard University. With Index by P. L. Phillips. Washington, 1904. Size 10½ × 7½, pp. 190.

Bermuda. *P. American A. Arts and Sci.* **40** (1905): 559–592. **Bigelow.**

Contributions from the Bermuda Biological Station for Research. No. 5, The Shoal-water Deposits of the Bermuda Banks. By H. B. Bigelow. *With Maps.*

Canada—Bay of Fundy. **Dawson.**

The currents at the entrance of the Bay of Fundy and on the steamship routes in its approaches off Southern Nová Scotia. From Investigations of the Tidal and Current Survey in the season of 1904. Published by the Department of Marine and Fisheries, Ottawa, Canada. Ottawa, 1905. Size 9½ × 6½, pp. 18. *Chart.*

Canada—Bibliography. **Wrong and Langton.**

Review of Historical Publications relating to Canada. Edited by G. M. Wrong and H. H. Langton. Vol. ix. Publications of the year 1904. Toronto: Morang & Co., 1905. Size 11 × 7½, pp. xii. and 240.

Canada—British Columbia. ——

Annual Report of the Minister of Mines for the year ending December 31, 1904, being an account of Mining Operations for Gold, Coal, etc., in the Province of British Columbia. Victoria, B.C., 1905. Size 10½ × 7½, pp. 318. *Map and Illustrations. Presented by the Department of Mines, Victoria, B.C.*

See note at p. 221, August number.

Canada—Place-names. ——

Fifth Report of the Geographic Board of Canada, containing all decisions to June

30, 1904. (Supplement to the Thirty-seventh Annual Report of the Department of Marine and Fisheries.) Ottawa, 1905. Size 10 × 6½, pp. 78.

Niagara. *Popular Sci. Monthly* **66** (1905): 489–504. **Clarke.**

The Menace to Niagara. By Dr. J. M. Clarke. *With Illustrations.*

Insists on the reality of the menace to Niagara from the operations of water-power companies, both American and Canadian.

North America—Geology. *J. Geology* **13** (1905): 89–104. ——

Report of the Special Committee for the Lake Superior region. With Introductory Note by C. R. Van Hise.

This committee was appointed to investigate the nomenclature and correlation of the geological formations of the U.S. and Canada.

United States. ——

Annual Reports of the Department of the Interior for the Fiscal Year ended June 30, 1902. Report of the Commissioner of Education. 2 vols. Pp. cxii. and 2448. Ditto June 30, 1903. Report of the Secretary of the Interior. Report of the Commissioner of the General Land Office. Pp. x. and 764. Indian Affairs, 2 parts, pp. (part i.) xii. and 628: (part ii.) 880. Miscellaneous Reports, 3 parts, pp. (part i.) 860; (part ii.) 958; (part iii.) viii. and 674. Size 9½ × 6. Also Twenty-fourth Annual Report of the United States Geological Survey. Pp. 302. Size 12½ × 8. Washington, 1903–4. *Maps and Illustrations. Presented by the U.S. Department of the Interior.*

United States—California—Santa Barbara Islands. **Eisen.**

An Account of the Indians of the Santa Barbara Islands in California. By Dr. G. Eisen. (Separatabdruck aus den Sitzungsberichten der K. Böhm. Gesellschaft der Wissenschaften, Prag, 1904.) Prag, 1904. London: A. Owen & Co. Size 10 × 6½, pp. 30. *Price 1s. net. Presented by the Publishers.*

Noticed in the Monthly Record (August, p. 220).

United States—Census. **Gannett.**

Twelfth Census of the United States, taken in the year 1900. Statistical Atlas. Prepared under the supervision of Henry Gannett. Washington: United States Census Office, 1903. Size 12 × 9½, pp. 58, 207 plates.

Gives the generalized results of the census in graphic form, with introductory letterpress.

United States—Census. ——

Bureau of the Census. Abstract of the Twelfth Census of the United States, 1900. Third edition. Washington, 1904. Size 9½ × 6, pp. xvi. and 454.

United States—Coal. **Bell.**

Coal Industry of the United States, 1903. Foreign Office, Miscellaneous, No. 631. 1905. Size 10 × 6½, pp. 36. *Price 2½d.*

See note at p. 88, *ante*.

United States—Historical. **Parkman.**

The California and Oregon Trail, being Sketches of Prairie and Rocky Mountain Life. By Francis Parkman. London: Dean & Son, [1905]. Size 7½ × 5, pp. xx. and 416. *Portrait. Price 2s. 6d. net. Presented by the Publishers.*

An acceptable reprint, at a popular price, of the work in which the well-known American historian gives his vivid personal impressions of travel and native life in the Far West. An introduction by Prof. E. G. Bourne supplies a sketch of Parkman's life and writings.

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Graziani.**

Dott. G. Graziani. La Emigrazione Italiana nella Repubblica Argentina. Torino, &c.: G. B. Paravia e Comp., 1905. Size 9 × 6½, pp. x. and 192. *Map. Presented by the Author.*

Of the million and a half emigrants into the Argentine from 1876 to 1899, 937,647 were Italians, and of these 651,337 were agriculturists.

Argentine Republic. **Boman.**

Migrations Précolombiennes dans le nord-ouest de l'Argentine. Communication faite à la Société des Américanistes de Paris, dans sa Séance du 6 décembre 1904. Par É. Boman. (Extrait du *Journal de la Société des Américanistes de Paris*, N.S.,

tome ii., No. 1, pp. 91–108.) 1905. Size 11 × 7¼. *Illustrations. Presented by the Author.*

Argentine Republic. *Minutes of P.I. Civil Engineers* **159** (1905): 290–294. **Rowbotham.**

Mines and Mining in the Argentine Republic. By J. McK. Rowbotham.

Atacama Desert. *B.I.G. Argentino* **21** (*n.d.*): 87–116. **Ambrosetti.**

Viaje á la Puna de Atacama. De Salta a Caurchari. Por J. B. Ambrosetti. *With Illustrations.*

Bahamas. **Allen and Barbour.**

Narrative of a Trip to the Bahamas. By G. M. Allen and T. Barbour. Cambridge, Mass., 1904. Size 10 × 6½, pp. 10. *Map and Illustrations. Presented by the Authors.*

The trip was chiefly for the study of the flora and fauna.

Bolivia. *B. Oficina Nac. Inmigración La Paz* **4** (1904): 484–530. **Bandelier.**

Mitos y Tradiciones aborigenes concernientes á la Isla de Titicaca, Bolivia. Por A. F. Bandelier.

Bolivia. *B. Oficina Nac. Inmigración La Paz* **4** (1904): 454–483. **Varnoux.**

Determinación de las co-ordenadas geográficas del punto de intersección del paralelo 22° A, con il rio Pilcomayo. L. Varnoux.

Bolivia and Peru. *Scottish G. Mag.* **21** (1905): 249–259. **Hill.**

Notes on a Journey in Bolivia and Peru around Lake Titicaca. By A. W. Hill. *With Illustrations.*

See short report of paper by Mr. Hill at the British Association last year (*Journal*, vol. **24**, p. 461).

Brazil. *B. Geolog. S. America* **13** (1902): 41–98. **Branner.**

Geology of the North-East Coast of Brazil. By J. C. Branner. *With Maps and Illustrations.*

Brazil. *B.S.G. Lima* **15** (1904): 87–93. **Herrera.**

Clima de la Amazonia. Por el Dr. G. E. Herrera.

Brazil. *Globus* **87** (1905): 281–283. **Koch.**

Dr. Theodor Kochs Forschungsreise in Brasilien.

See note in the July number (p. 89).

Brazil. *Globus* **87** (1905): 341–347. **Koenigswald.**

Die indianischen Muschelberge in Südbrasilien. Von G. von Koenigswald. *With Illustrations.*

Will be noticed in the Monthly Record.

Brazil and Argentine Republic. *Globus* **87** (1905): 216–221. **Vogt.**

Die Victoriafälle des Iguazú. Von F. Vogt. *With Map and Illustrations.*

British Guiana and Brazil—Boundary.

British Guiana Boundary Arbitration with the United States of Brazil. The Case on Behalf of the Government of His Britannic Majesty (pp. 162); The Counter Case (pp. 190); Notes to the Counter Case (pp. 104); The Argument (pp. iv. and 178); Index to Sir Robert Schomburgk's Reports, which form volume 3 of Annex to British Case (pp. 86); Extracts from, and Notes on, some of the Printed Books examined in connection with the British Guiana—Brazil Boundary Arbitration (pp. v. and 156).

Boundary. British Guiana—Brazil. Translations of Additional Portuguese Documents (pp. 72).

Question de la Frontière entre la Guyane Britannique et le Brésil. Mémoire présenté par le Gouvernement de sa Majesté Britannique (pp. 176); Annexe—vol. 1, 1596–1822 (pp. xvi. and 224); vol. 2, 1827–1902 (pp. xii. 150, vi. 44, 26, and 6); vol. 3, 1835–1843 (pp. 192); vol. 4 (pp. vi. and 34); Contre-Mémoire (pp. iv. and 202); Notes Adjointes au Contre-Mémoire (pp. 106); Annexe au Contre-Mémoire—vol. 1 (pp. 66), vol. 2 (pp. vi. and 56); Argument (pp. iv. and 184). London, 1903–4. Size 13 × 8½. *Maps.*

Atlas. 2 vols. Size 29½ × 22½. *Presented by the Foreign Office.*

Chile and Argentina. **Patron.**

República de Chile. Oficina de Límites. La Cordillera de los Andes entre las latitudes 46° i 50° S. Luis Riso Patron S. Santiago de Chile, 1905. Size 11 × 8, pp. x. and 234. *Maps and Illustrations.*

A continuation of the collection of documents illustrating the investigation of the Chili-Argentine Boundary.

Cuba. *B.S.G. Lyon* **20** (1905): 55–66. **Berchon.**

Renseignements Économiques et Géographiques sur l'Ile de Cuba. Par C. Berchon. *With Map.*

Ecuador. *C. Rd.* **140** (1905): 998–1006. **Poincaré.**

Rapport présenté au nom de la Commission chargée du contrôle scientifique des opérations géodésiques de l'Équateur. Par H. Poincaré.

See note in the Monthly Record (August, p. 221).

French Guiana. *La G., B.S.G. Paris* **11** (1904): 191–204. **Deydier.**

Trois ans à la Guyane française (1901–1905). Par J. Deydier. *With Illustration.*

Martinique. *Ann. G.* **14** (1905): 97–110. **Lapparent**

La Montagne Pelée et ses éruptions. Par A. de Lapparent.

Martinique—Mont Pelée. **Lacroix.**

La Montagne Pelée et ses éruptions. Par A. Lacroix. Paris: Masson et Cie., 1904. Size 13 × 10, pp. xxii. and 662. *Plates and Illustrations. Presented by the Académie des Sciences, Paris.* [To be reviewed.]

Paraná. **Seljan.**

Mirko y Stevo Seljan. El salto del Guayrá. La Chute du Guayrá. Buenos Aires, 1905. Size 10½ × 7½, pp. iv. and 44. *Map and Illustrations. Presented by the Authors.*

The authors made a careful survey of the Guayra falls during a scientific mission to that region. They make the somewhat bold statement that these falls stand at the head of all the waterfalls in the world for the volume of water precipitated, relying solely on the great volume of the Parana at its mouth, after it has received all its tributaries.

Peru. *B.S.G. Lima* **13** (1903): 121–159, 249–295, 385–418; **15** (1904): 1–57. **Brüning.**

De Chiclayo á puerto Meléndez en el Marañón. Por E. Brüning. *With Maps and Illustrations.*

Peru. *B.S.G. Lima* **15** (1904): 60–65. **Espinar.**

El rio Igara-Paraná. Por el capitán F. E. Espinar. *With Map.*

There is a northern tributary of the Putumayo, on which a Peruvian station has been established, though the territory has been shown as Columbian on many maps.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia—Calvert Expedition. **Hill.**

The Calvert Scientific Exploring Expedition. (Australia, 1896.) Compiled by J. G. Hill. London: G. Philip & Son, 1905. Size 9½ × 7, pp. viii. and 44. *Maps Price 2s. Two copies, presented by the Author and Publishers.*

Compiled from telegraphic news and Australian newspaper accounts.

Caroline Islands. *Petermanns M.* **51** (1905): 52–57. **Senfft.**

Die Karolineninseln Oleai und Lamutrik. Von A. Senfft. *With Map and Illustrations.*

Marianne Islands—Guam. **Safford.**

The useful plants of the Island of Guam, with an introductory account of the physical features and natural history of the island, of the character and history of its people, and of their agriculture. By W. E. Safford. (Smithsonian Institution, U.S. National Museum. Contributions from the *U.S. National Herbarium*, vol. 9.) Washington, 1905. Size 10 × 6, pp. 416. *Map and Illustrations. Presented by the U.S. National Museum.*

New Guinea. **Niermeyer.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **22** (1905): 499–502.

A. B. Meyer's doorkruising van Nieuw-Guinea op zijn smalst. Door J. F. Niermeyer.

New Zealand. *Queensland G.J.* **19** (1903–4): 37–44. **Woolnough.**

New Zealand: its Geographical and Meteorological Conditions considered in their bearing on Field Industries. By G. Woolnough.

New Zealand—Statistics.

Statistics of the Colony of New Zealand, 1903. 2 vols. Wellington, 1904. Size 13 × 8, pp. 618 and xvi.

Queensland. *Queensland G.J.* **19** (1903–4): 32–36. **Douglas.**

Maritime Boundary of Queensland. By the Hon. J. Douglas, C.M.G.

Queensland. *Minutes of the P.I. Civil Engineers* **159** (1905): 315–323. **Williams.**

The Artesian System of Western Queensland. By C. J. R. Williams. *With Diagrams.*

South Australia—Northern Territory. **Searcy.**

In Northern Seas. Being Mr. Alfred Searcy's Experiences on the North Coast of Australia, as recounted to E. Whitington. Reprinted from the *Register* (South Australia). Adelaide, 1905. Size 10 × 6½, pp. 64. *Map and Illustrations.*

Reminiscences dating from twenty-five years ago and onwards, printed with a view to attracting attention to the advantages of the Northern Territory.

POLAR REGIONS.

Antarctic. **Arctowski.**

Antarctic Meteorology and International Co-operation in Polar Work. By Henryk Arctowski. (Paper read at the Eighth International Geographical Congress, New York, 1904.) Size 9½ × 6, pp. 6. *Presented by the Author.*

Arctic. **Spencer.**

Dr. Nansen's "Bathymetrical Features of the North Polar Sea, with a discussion of the Continental Shelves and the Previous Oscillations of the Shore-line." Reviewed by J. W. Spencer. (From the *American Geologist*, vol. 25, April, 1905.) Size 9½ × 6, pp. 221–235. *Presented by the Author.*

Arctic—Ice. **Garde.**

The state of the Ice in the Arctic Seas, 1904. Prepared by V. Garde. (Special print of the Nautical-Meteorological Annual of the Danish Meteorological Institute.) Size 12½ × 9½, pp. xvi. *Maps.*

The conclusion is reached that the winter of 1903–4 was comparatively mild in the region north of the Atlantic, and that the ice brought down during the year by the East Greenland current was below the normal; the Labrador current, on the other hand, carried more icebergs than in a normal year, though less than in 1903.

Arctic—Sverdrup Expedition. **Nathorst.**

Report of the Second Norwegian Arctic Expedition in the *Fram*, 1898–1902. No. 1. A. G. Nathorst: Die oberdevonische Flora des Ellesmere-Landes. Published by Videnskabs-Selskabet i Kristiania: Kristiania. Printed by A. W Brøgger, 1904. Size 11 × 7½, pp. 22. *Map and Illustrations.*

Greenland. *G. Tidskrift* **18** (1905–6): 46–69. **Bruun.**

Om Vestgrønlænderne. Af Kaptajn D. Bruun. *With Illustrations.*

Greenland. *Petermanns M.* **51** (1905): 90. **Engell.**

Eine nachtertiäre Wärmeperiode in Grönland. Von Dr. M. C. Engell. *With Map.*

MATHEMATICAL GEOGRAPHY.

Astronomy. **Heath.**

Our Stellar Universe: Six Stereograms of Sun and Stars. By T. E. Heath. London: King, Sell & Olding, [1905]. Size 8½ × 4½. *Price 3s. net. Presented.*

Describes drawings for use with the stereograph, embracing those stars of which the parallax has been determined.

Cartography. *Abh. K.K.G. Ges. Wien* **5** (1903–4), No. 4: pp. 36. **Schjerning.**

Ueber mittabstandstreue Karten. Von Dr. W. Schjerning. *With Maps.*

Discusses the mathematical principles involved and method of constructing the degree-net, in the case of a projection (whether normal, transverse, or diagonal), which shall give all distances, measured in a straight line from the centre of the map, their true proportion. By sacrificing accuracy of azimuth, the projection may be modified so as to lessen the exaggeration which otherwise occurs at a distance from the centre in a tangential direction.

Compass. *M.G. Ges. München* **1** (1905): 161–260. **Wolkenhauer.**

Beiträge zur Geschichte der Kartographie und Nautik des 15. bis 17. Jahrhunderts. Von Dr. A. Wolkenhauer. *With Maps and Illustrations.*

Deals with the gradual acquisition of knowledge respecting the variation of the compass and other of its properties.

Instrument. *Sci. P.R. Dublin S.* **10** (1904): 146–148. **Grubb.**
A new form of Position-finder for adaptation to Ships' Compasses. By Sir H. Grubb, F.R.S. *With Illustrations.*

Instrument. *M.G. Ges. München* **1** (1905): 269–283. **Schück.**
Das Horometer, ein älteres Instrument der mathematischen Geographie. Von A. Schück. *With Illustrations.*
The horometer was an instrument for determining the time at any position on the Earth's surface.

Instruments. **Gurley.**
A Manual of the Principal Instruments used in American Engineering and Surveying. Manufactured by W. & L. E. Gurley, Troy, N.Y. 37th Edition. Troy, N.Y.: W. & L. E. Gurley, 1904. Size 7 × 4½, pp. 446. *Illustrations. Price 50 cents. Presented by the Publishers.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Botanical Geography. *B.S. Languedoc. G.* **28** (1905): 5–14. **Blanc and Hardy.**
La cartographie botanique détaillée sur les environs de Montpellier pris comme exemple. Par L. Blanc et M. Hardy. *With Map.*

Climate. *Tijds. K. Ned. Aard. Genoots. Amsterdam* **22** (1905): 441–474. **Easton.**
De zon en het klimaat. Door Dr. C. Easton. *With Diagrams.*

Erosion Forms. *Sitzb. K.B.A.W. München* (1904): 397–420. **Günther.**
Erdpyramiden und Büsserschnee als gleichartige Erosionsgebilde. Von S. Günther. *With Illustrations.*
See note in the July number (p. 91).

Geological History. *G.Z.* **11** (1905): 65–85, 134–145. **Frech.**
Die wichtigsten Ergebnisse der Erdgeschichte. Von F. Frech. *With Illustrations.*

Geomorphology. *American J. Sci.* **19** (1905): 265–273. **Davis.**
The Bearing of Physiography upon Suess' Theories. By W. M. Davis.
Examines Suess' views in the light of the author's studies in the Tian Shan, etc.

Geomorphology—Cirques. *B. American G.S.* **37** (1905): 86–91. **Brown.**
Cirques: A Review. By R. M. Brown.
A useful summary of the varying views which have been held as to the origin of cirques.

Geomorphology—Mounds. *Science* **21** (1905): 514–516. **Branner.**
Natural Mounds or "Hog-wallows." By Prof. J. C. Branner.
Noticed at p. 219, *ante.*

Geophysics. *Nature* **72** (1905): 30–31. **See.**
Current Theories of the Consolidation of the Earth. By Dr. T. J. J. See.

Glaciers. **Chamberlin.**
A Contribution to the Theory of Glacial Motion. By T. C. Chamberlin. (The University of Chicago. The Decennial Publs. Printed from vol. 9.) Chicago, 1904. Size 11½ × 9, pp. 16. *Plates.*
Noticed in the Monthly Record for May (p. 571).

Ice—Nieve penitente. *Globus* **87** (1905): 261–262. **Deecke.**
Lässt sich der "Busserschnee" als vereiste Schneewehen auffassen? Von W. Deecke.
See note in the July number (p. 91).

Ice Age. **Howorth.**
Ice or Water? Another Appeal to Induction from the Scholastic Methods of Modern Geology. By Sir Henry H. Howorth. In 3 vols. Vols. 1 and 2. London: Longmans & Co., 1905. Size 9 × 6, pp. (vol. 1) lvi. and 536, and (vol. 2) viii. and 498. *Price* (2 vols.) 32*s. net. Presented by the Author.* [To be reviewed.]

Ice-erosion. *J. Geology* **13** (1905): 160–173. **Tarr.**
Some instances of moderate glacial erosion. By R. S. Tarr. *With Illustrations.*

Lagoons and Tides. **Marchi.**

Luigi de Marchi. La morfologia lagunare e il regime stazionario di marea. (Atti R. I. Veneto, t. lxiv. p° ii°.) Venezia, 1905. Size 9½ × 6½, pp. 683–714. *Map. Presented by the Author.*

Limnology. *G. Tidskrift* **18** (1905–6): 15–26. **Wesenberg-Lund.**

Om Naturforholdene i skotske og danske Søer. En Sammenlignende Studie. Af Dr. C. Wesenberg-Lund. *With Illustrations.*

Mountain Structure. *J. Geology* **13** (1905): 105–125. **Daly.**

The Accordance of Summit Levels among Alpine Mountains: the fact and its significance. By R. A. Daly. *Also separate copy, presented by the Author.*

To be noticed in the Monthly Record.

Meteorites. **Fletcher.**

British Museum (Natural History). Mineral Department. An Introduction to the Study of Meteorites, with a list of the Meteorites represented in the collection on January 1, 1904. By L. Fletcher. 1904. Size 8½ × 5½, pp. 110. *Plan. Presented by the British Museum.*

Meteorology. *Globus* **87** (1905): 317–323. **Krebs.**

Das meteorologische Jahr 1903–1904 und die Hochwasserfrage. Von W. Krebs. *With Diagrams.*

Meteorology. *Nature* **72** (1905): 111–112. **Lockyer.**

Islands for Weather Forecasting Purposes. By Dr. W. J. S. Lockyer. *With Diagrams.*

Oceanography. *B. Musée Océanograph. Monaco*, No. **31** (1905): pp. 12. **Chevallier.**

Relation entre la densité et la salinité des eaux de mer. Par M. Chevallier. *With Diagram.*

Oceanography. **Herwig.**

Die beteiligung Deutschlands an der Internationalen Meeresforschung. I. und II. Jahresbericht erstattet von dem Vorsitzenden der Wissenschaftlichen Kommission Dr. W. Herwig. Berlin: O. Salle, 1905. Size 11½ × 8, pp. 112. *Maps and Illustrations. Presented by the Commission.*

Oceanography. *Petermanns M.* **51** (1905): 1–4, 25–31, 62–63. **Nansen.**

Die Ursachen der Meeresströmungen. Von Prof. Dr. F. Nansen.

Noticed in the Monthly Record (*ante*, p. 336).

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. *Deutsch. Rundschau G.* **27** (1905): 289–299. **Kirchhoff.**

Ueber tellurische Auslese. Von Prof. Dr. A. Kirchhoff.

Discusses the question of adaptation to environment by natural selection. The great chest-capacity of dwellers at high elevations is among the instances cited.

Anthropogeography—Cities. *Contemporary Rev.* **87** (1905): 413–426. **Geddes.**

Civic Education and City Development. By Prof. P. Geddes.

Anthropology—Pygmies. *Globus* **87** (1905): 309–312, 325–329. **Schmidt.**

Prähistorische Pygmäen. Von E. Schmidt.

Commerce. *Rev. Gen. Marina* **56** (1905): 145–177. **Bichon.**

La evolución del comercio del mundo y sus relaciones con los descubrimientos cientificos del siglo XIX. Por M. Bichon.

Commercial—Treaties. **[Hertslet.]**

A Complete Collection of the Treaties and Conventions and Reciprocal regulations at present subsisting between Great Britain and Foreign Powers; and of the Laws, Decrees, Orders in Council, etc., concerning the same; so far as they relate to Commerce and Navigation, the Slave Trade, Post Office Communications, Copyright, etc. [In continuation of the Collection compiled by Sir Edward Hertslet, K.C.B.] Vol. **20**. Compiled and Edited by A. H. Oakes and H. F. T. Streatfield; vol. **21**, by A. H. Oakes and R. W. Brant; vol. **23**, by the same. London: Eyre & Spottiswoode, and Wyman & Sons, 1898, 1901, 1905. Size 9 × 6, pp. (vol. **20**) xxiv. and 1062; (vol. **21**) xxvi. and 1298; (vol. **23**) xxii. and 1334. *Maps. Price (each vol.)* **15s.**

Historical. **Berger.**

Mythische Kosmographie der Griechen. Von Prof. Dr. E. H. Berger. Leipzig: B. G. Teubner, 1904. Size 10 × 7, pp. 42. *Price* 1m. 80. *Presented by the Publisher.*

Historical—Early Travels. **Hakluyt.**

The Principal Navigations, Voyages, Traffiques, and Discoveries of the English Nation. By R. Hakluyt. Vol. 9 (pp. xvi. and 474); vol. 10 (pp. xviii. and 502); vol. 11 (pp. xviii. and 458); vol 12 (pp. xiv. and 470). Glasgow: J. MacLehose & Sons, 1904–5. Size 9 × 6. *Maps and Illustrations. Two copies, one presented by the Publishers.*

The last volume consists of an essay by Prof. Walter Raleigh on the English voyages of the sixteenth century, and a complete index to the collection, now supplied for the first time.

Historical—Early Travels. **Purchas.**

Hakluytus Posthumus or Purchas His Pilgrimes. Contayning a History of the World in Sea Voyages and Lande Travells by Englishmen and others. By Samuel Purchas. Volumes 5 and 6. Glasgow: J. MacLehose & Sons, 1905. Size 9 × 6, pp. (vol. 5) xviii. and 530; (vol. 6) xx. and 544. *Facsimile Maps and Illustrations. Price* 12*s.* 6*d. net per vol. Presented by the Publishers.*

See note at p. 475, vol. 25. Each volume of the reprint corresponds to a "book" of the original, of which each "part" contained ten, and each volume five.

BIOGRAPHY.

Nasir-i-Khusraw. *J.R. Asiatic S.* (1905): 313–352. **Browne.**

Nasir-i-Khusraw, Poet, Traveller, and Propagandist. By E. G. Browne.

The subject of this notice lived in the eleventh century, and wrote, besides poetry, an account of his extensive journeys through Persia, Asia Minor, Syria, Egypt, Arabia and Bahrein.

Stanley. **Joûbert.**

Joseph Joûbert. Stanley, le roi des explorateurs (1840–1904). Angers: Germain & G. Grassin, 1905. Size 11½ × 7½, pp. 54. *Portrait. Presented by the Author.*

Stübel. *G.Z.* 11 (1905): 129–134. **Wagner.**

Alphons Stübel und seine Bedeutung für die geographischen Forschungsmethoden. Von P. Wagner. *With Plate.*

Suess. *Nature* 72 (1905): 1–3. **Geikie.**

Scientific Worthies. Eduard Suess. By Sir A. Geikie, F.R.S. *With Portrait.*

GENERAL.

Bibliography. **Baschin.**

Bibliotheca Geographica. Herausgegeben von der Gesellschaft für Erdkunde zu Berlin, bearbeitet von O. Baschin. Band 10. Berlin: W. H. Kühl, 1904. Size 9½ × 6, pp. xvi. and 572. *Presented by the Gesellschaft für Erdkunde, Berlin.*

Each succeeding volume of this indispensable work of reference comes nearer the desired end of supplying a complete record of geographical literature. It is particularly valuable for the care which is taken to include occasional papers of geographical interest in non-geographical serials. The number of authors quoted reaches nearly 6000 in the present volume. It is only to be wished that in course of time the issue may take place somewhat nearer the year dealt with.

Bibliography.

Amérique, Asie, Afrique, Australie. Voyages, découvertes, ethnographie, géographie, colonisation, navigation. Catalogue de Livres en vente aux prix marqués. Amsterdam: F. Muller et Cie., [1905]. Size 9½ × 6½, pp. 266.

A large number of works of interest to the geographer are here offered for sale, many relating to early voyages and travels.

British Colonies. *J.R. Colon. I.* 36 (1905): 279–333. **Bruce.**

The Crown Colonies and Places. By Sir C. Bruce, G.C.M.G.

Lays stress on the fact that practically all the Crown colonies are in the tropics, and shows their importance as producers of tropical products.

Educational. **Kraentzel.**

Travaux du Séminaire de Géographie de l'Université de Liége. I. La Géographie dans l'enseignement moyen. Par F. Kraentzel. Liége: D. Cormaux, 1905. Size 9½ × 6½, pp. 38.

French Colonies. **Mourey and Brunel.**

L'Année Coloniale, publiée sous la direction de C. Mourey, L. Brunel, en collaboration avec C. Dupontès. Quatrième Année (1902–1903.) Paris: Chevalier & Rivière, 1905. Size 7½ × 5, pp. 340. *Price 4 fr. Presented by the Publishers.*

Geographical Names. **Wollemann.**

Bedeutung und Aussprache der wichtigsten schulgeographischen Namen. Von Dr. A. Wollemann. Braunschweig: W. Scholz, 1905. Size 9½ × 6½, pp. 68. *Presented by the Author.*

Intended especially for use in German schools, for which it appears very suitable. It may also be of more general use for purposes of reference, though the names included are limited to those most commonly in use.

World. **Moncrieff.**

The World of To-day. A Survey of the Lands and Peoples of the Globe as seen in Travel and Commerce. By A. R. Hope Moncrieff. Vol. 2. London: The Gresham Publishing Co., 1905. Size 11 × 7½, pp. vi. and 266. *Maps, Plates, and Illustrations. Price 8s. net. Presented by the Publishers.*

See note in vol. 25, p. 69.

Year-Book. **Keltie and Renwick.**

The Statesman's Year-book, 1905. Edited by Dr. J. Scott Keltie, with the assistance of I. P. A. Renwick. London: Macmillan & Co., 1905. Size 7½ × 5, pp. lvi. and 1424. *Maps. Price 10s. 6d. net.*

As usual, this is provided with a number of maps illustrating matters of current interest, *e.g.* the distribution of British fleets, sources of meat-supply of the United Kingdom, wheat and cotton producing areas, etc., etc.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Central Europe. **Liebenow and Ravenstein.**

Liebenow - Ravenstein's Special - Radfahrerkarte von Mittel - Europe. Scale 1:300,000 or 4·7 stat. miles to an inch. Sheets: 54, Haag; 67, Ostende; 68, Antwerpen; 81, Calais; 95, Amiens; 137, Orléans; 138, Troyes; 151, Bourges; 152, Autun. Frankfort a.-Maine: Ludwig Ravenstein, 1905.

England. **Bartholomew.**

Bartholomew's New Reduced Survey. Scale 1:127,260 or 2 stat. miles to an inch. Salisbury Plain District. Edinburgh: John Bartholomew & Co., [1905]. *Price, mounted, 2s. net. Presented by the Publisher.*

England and Wales. **Ordnance Survey.**

ORDNANCE SURVEY OF ENGLAND AND WALES:—Sheets published by the Director-General of the Ordnance Survey, Southampton, from July 1 to 31, 1905.

1 inch—(third edition):—

In outline, 94, 251. 1*s. each* (engraved).
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6-inch—County Maps (first revision):—

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N.W., 43 S.E., 44 N.W., S.W., 45 S.W., 47 N.E., S.W., S.E., 49 N.W. (50 N.E. and 51 N.W.), 85 N.E. **Warwickshire and ditto (Det.)**, 14 S.W., 16 S.W., S.E., 19 S.E., 20 N.W., S.W., S.E., 23 N.W., 28 S.E., 42 N.E., 50 S.E. **Worcestershire and ditto (Det.** No. 3), 6 S.W., 18 N.E., 19 S.E., 20 S.E., 27 N.E., 29 N.W., 30 N.W., S.W., 33 N.W., S.W., S.E., 34 N.W., N.E., S.W., S.E., 35 N.W., N.E., S.W., 40 S.E., 41 N.W., N.E., S.W., S.E., 42 N.W., 44 S.E., 47 N.E., S.E., 48 N.W., 54 N.W. **Yorkshire** (First Revision of 1891 Survey), 286 S.W. 1*s. each.*

25-inch—County Maps (first revision):—

Brecknockshire, IX. 10. **Cardiganshire**, XVIII. (15 and 11); XIX. 2, 5, 7, 9, 11, 13, 14, 15, 16; XX. 1, 8, 10, 12, 13; XXIV. 1, 2, 5, 7, 8, 10, 11, 14; XXV. 2, 3, 4, 6, 7, 8, 9, 10, 11, 12; XXVI. 5, 8, 9; XXVII. 3, 9; XXXIII. 1, 2; XXXVI. 10. **Carmarthenshire**, III. 10. **Devonshire**, XLVIII. (3 and 2), 5, 6, 8, 9, 10, 11, 13, 14; LIV. 13, 14, 15; LXVI. 1, 3, 6, 8, 10, 11, 12, 16; LXVII. 1, 5, 9; LXXVIII. 2, 3, 4; XC. 2, 3, 4, 6, 7, 8, 10, 11, 12, 15, 16; XCI. 1, 4, 5, 8, 9, 12; XCII. 1, 2, 3, 4, 5, 7, 8, 10, 11, 12; XCIII. 1, 5, 9; C. 3, 10, 11. **Lincolnshire**, LXXXV. 2, 3, 7, 8, 11, 12, 15, 16; LXXXVI. 1, 2, 5, 6, 8, 13; C. 1, 2, 3, 4, 5, 7, 8, 10, 12, 14, 15, 16; CI. 13; CXVIII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14. **Norfolk**, XLIV. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; LVI. 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 15, 16; LVII. 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; LVIII. 5, 6, 7, 9, 10, 11, 13, 14, 15; LXVIII. 3, 4; LXIX. 2, 3, 4; LXX. 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; LXXI. 5, 6, 7, 9, 10, 11, 13, 14, 15; XCIX. 12. **Suffolk**, IX. 12; XI. 13; XIX. 1, 2; XXI. 3. **Warwickshire**, XXVI. 13; XXVII. 16; XXVIII. 14; XXXI. 16; XXXII. 13, 14, 15; XXXIII. 13, 14, 15; XXXV. 8; XXXVII. 4, 8, 12; XXXVIII. 1, 2, 3, 5, 7, 8, 9, 10, 11, 12; XXXIX. 5, 6, 7, 10, 11; XL. 3. **Yorkshire** (First Revision of 1891 Survey), CCLXXXIX. 10. 3*s. each.*

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England and Wales. **Geological Survey.**

Sheet Memoirs. In Explanation of New Series Maps.

141. Geology of the country between Derby, Burton-on-Trent, Ashby-de-la-Zouch, and Loughborough. *Price* 2*s.*

282. Geology of the country south and east of Devizes. *Price* 1*s.*

(*E. Stanford, London Agent.*)

Germany. **K. Preussische Landesaufnahme.**

Karte des Deutschen Reiches. Herausgegeben von der Kartographischen Abteilung der königlichen Preussische Landesaufnahme. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets: (plain) 343, Lübben; (brown hills and contours) 382, Brilon. Berlin, 1904–5. *Price* 1.50 *mark each sheet.*

Norway. **Nissen.**

Kart over det Nordlige Norge. Udarbeidet ved Oberst Per Nissen. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. 1905.—Kart over det Sydlige Norge. Udarbeidet ved Oberst Per Nissen. Scale 1 : 600,000 or 9·5 stat. miles to an inch. 4 Sheets. 1903. Christiania: H. Aschehoug & Co. *Presented by the Publisher.*

These are two useful maps for tourists. The second includes the whole of southern Norway up to about 65° 15′ N. lat., and is well drawn; but the first, which is on a smaller scale, is somewhat indistinct and confused as regards place-names and general detail. Both are printed in colours. An index to places accompanies the map of Northern Norway.

ASIA.

Japan. **Japanese Imperial Geological Survey.**

Topographical Map of Japan. Scale 1 : 200,000 or 3·1 stat. miles to an inch. Sheet Murotozaki. Tokyo: Imperial Geological Survey, 1905. *Presented by the Imperial Geological Survey of Japan.*

Manchuria. **Military Information Division, U.S. Army.**

Map showing Seat of War in Manchuria. Scale 1 : 1,000,000 or 15·78 stat. miles to an inch. Prepared in the Second Division, General Staff (Military Information Division), Washington, April, 1905. Supplement to the *National Geographic Magazine*, June, 1905.

This map will doubtless be useful to newspaper readers and others for following the movements of the Japanese and Russian armies. It is based upon the 'Karte von Ost-China,' by the k. Preuss. Landesaufnahme. Hills are shown by horizontal form lines in black.

ORDNANCE SURVEY MAPS.

The following is a list of the various Ordnance Survey Maps of the British Isles on sale to the public, together with the prices. E. Stanford, 12, 13 and 14, Long Acre, W.C., is the London agent; there are also provincial agents in most of the important towns of England, Scotland, and Ireland. Publications may also be ordered through any bookseller, and in towns where there are no agencies they may be ordered at the head post office.

	Price per sheet. On paper. s. d.	Mtd. on linen. s. d.
$\frac{1}{1000000}$ or 15·782 miles to 1-inch Scale.		
1. United Kingdom. In two sheets. Size 34½ × 24½ inches. Price 5s. Mounted as a wall map, 10s. Ditto, with moulding and roller, £1. (*Will be published by March* 31, 1905.)		
10 miles to 1-inch Scale.		
2. Great Britain, engraved. Printed from a transfer from copper, latitude and longitude not marked.		
(*a*) Outline edition in 12 sheets, water in blue. Size about 20 × 13 inches. On paper	1 0	
(*b*) Hill shaded edition in 8 sheets, with hills in brown, roads sienna and water blue. (Sheets (1 and 2) (3 and 4) (5 and 6) (7 and 8) of this edition are combined.) On paper	1 0	
Sheets specially printed for mounting as one map, together with a title sheet and marginal lines. Price 9s. per set.		
The above sheets, mounted on holland, to form one map, and bound with blue ribbon. Price complete, £1 1s.; or with moulding and roller, £1 10s.		
4 miles to 1-inch Scale.		
3. England and Wales, engraved in black, latitude and longitude marked, no hill shading or contours. Size 22½ × 15 inches. On paper	1 6	
4. England and Wales, engraved. Printed from a transfer from copper, hills in brown, roads sienna, water blue, woods green. Size 22½ × 15 inches.		
(*a*) On paper	1 6	
(*b*)*On thin paper, folded in cover or unfolded	1 6	2 0
5. Scotland, engraved. Printed from a transfer from copper, with water in blue, latitude and longitude marked, no hill shading or contours. Size 18 × 12 inches. On paper	1 0	
6. Scotland, engraved. Printed from a transfer from copper, hills in brown, roads sienna, water blue, woods green. Size 18 × 12 inches.		
(*a*) On paper	1 0	
(*b*)*On thin paper, folded in cover or unfolded	1 0	1 6
7. Ireland, engraved. Printed from a transfer from copper, with water in blue. Size 18 × 12 inches. On paper	1 0	
8. County and District Maps of Great Britain, cheap edition, roads in brown, latitude and longitude marked, on thin paper or folded in covers. In sheets. Unmounted 6*d.* and	1 0	
Folded in covers 9*d.* and	1 0	
2 miles to 1-inch Scale.		
9.*England and Wales, photo-etched on copper. Printed from a transfer from copper, hills and contours in brown, principal roads burnt sienna, woods green, water blue, latitude and longitude marked. Size 18 × 12 inches	1 0	
(*a*) Folded in cover or unfolded		1 6
(*b*) Combined sheets (various sizes) folded in cover or unfolded	1 6	2 0
1-inch Scale.		
10. England and Wales, outline, contours in black, latitude and longitude marked. Size 18 × 12 inches. On paper	1 0	
11. Ditto, hills hachured in brown, latitude and longitude marked. Size 18 × 12 inches. On paper	1 0	
12. Ditto, hills hachured in black, latitude and longitude marked. Size 18 × 12 inches. On paper	1 0	

* Publication in progress.

	Price per sheet. On paper. s. d.	Mtd. on linen. s. d.
13. England and Wales, hills hachured in brown, contours red, roads sienna, water blue, woods green (on revised edition), magnetic variation shown, latitude and longitude not marked. Size 18 × 12 inches. On thin paper, either flat or folded in covers. Single sheets	1 0	1 6
Combined sheets	1 6	2 0
14. Scotland, outline and contours in black, latitude and longitude marked. Size 24 × 18 inches. On paper	1 6	
15. Ditto, hills hachured in brown, and black contours, latitude and longitude marked. Size 24 × 18 inches. On paper	1 6	
16. Ireland, outline, not contoured, in black, latitude and longitude marked. Size 18 × 12 inches. On paper	1 0	
17.*Ditto, outline, not contoured, in black, latitude and longitude marked, showing county, rural, urban, and county borough boundaries in red. Size 18 × 12 inches	1 0	
18. Ditto, hills hachured in black, latitude and longitude marked. Size 18 × 12 inches. On paper	1 0	
19.*Ditto, hills hachured in brown, roads sienna, water blue, woods green, latitude and longitude marked. Size 18 × 12 inches. On thin paper, either flat or folded in covers	1 0	1 6
20.*Combined maps of areas round certain large towns, or other areas, such as the New Forest and Lake District, and published in various forms and sizes. These maps usually show outline and contour in black and roads in brown. In sheets, unmounted	9d. to 1 6	
Folded in cover	1s. to 1 6	
6-Inch Scale.		
21. Great Britain, water coloured blue or back lined, contours in black, latitude and longitude marked. Heliozincographed or photozincographed. Size 18 × 12 inches	1 0	
Engraved or photozincographed (where not published in quarter sheets). Size 36 × 24 inches	2 6	
22. Ireland, engraved or heliozincographed, contours in black, latitude and longitude not marked. Size 36 × 24 inches	2 6	
$\frac{1}{1250}$ Scale.		
23. Houses ruled in black, water blue or back lined, latitude and longitude not marked. Size 38 × 25½ inches	3 0	
24. Houses red, water blue, roads brown, latitude and longitude not marked. Unrevised editions only coloured in this form. Size 38 × 25½ inches. From 2s. 6d. to 23s., according to the amount of colouring. This form is gradually being superseded by 22.		
Town Scales.		
25. $\frac{1}{500}$ scale, houses stippled. Size 38 × 25½	2 6	
26. Ditto, houses ruled. Size 38 × 25½	2 6	
27. Ditto, houses red, water blue, roads brown. Size 38 × 25½ inches. From 2s. 6d. to 15s., according to the amount of colouring. Applies to unrevised only.		
28. 5-feet scale, houses stippled. Revised. Size 36 × 24 inches	2 6	
Index Maps.		
29. Indexes to the sheets of the 1-inch scale maps of England and Wales, Scotland, and Ireland, scale 30 miles to an inch. Sizes about 18 × 13 inches	0 2	
30.*Index to the sheets of the 6-inch scale map, parishes coloured. England and Wales. Size 18 × 12 inches	1 0	
Scotland. Size 24 × 18 inches	1 6	
31.*Index to the sheets of the 1 : 2500 scale map, parishes coloured. England and Wales. Size 18 × 12 inches	1 0	
Scotland. Size 24 × 18 inches	1 6	
Nos. 30 and 31 are identical with Nos. 10 and 14, but with sheet lines added, printed on thin paper, and coloured to show civil parishes.		

* Publication in progress.

Selangor. **Revenue Survey Office, Selangor.**

Selangor. Federated Malay States. Scale 1 : 126,720 or 2 stat. miles to an inch. Compiled at the Revenue Survey Office from actual surveys and various explorations. Selangor: Revenue Survey Office, 1904. *Presented by H. Redfearn Shaw, Esq., Superintendent of Revenue Surveys.*

This is by far the best general map of Selangor published up to the present time, and shows clearly the present state of exploration and survey. Many districts are still practically unexplored, and although the best information has been utilized in the construction of the map, much of this is necessarily of an approximate character. Railways, roads and paths, alienated lands agricultural and mining, and information concerning surveys used are shown by different symbols and colours, and there is also a table of statistical information concerning the state. The map is printed in colours by Messrs. J. Bartholomew & Co.

AFRICA.

Africa. **Topographical Section, General Staff.**

Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Sheet 74, Cross River. London: T.S., G.S., War Office, 1905. *Price 2s. each sheet. Presented by the Director of Military Operations.*

Gold Coast Colony. **Guggisberg.**

Supplement sheet to the Tarkwa Mining Map. Corrected to April, 1905, showing Fura-Prestea Tramway. Scale 1 : 50,000 or 1·3 inch to a stat. mile. Compiled under the direction of Major F. G. Guggisberg, R.E., Director of Surveys, Gold Coast Colony. *Presented by Major F. G. Guggisberg,* R.E.

This supplement is on tracing-paper, and can be fitted over the sheet of Major Watherston's map, to which it refers, and which was noticed in the last number of the *Geographical Journal*. The Fura-Prestea Tramway is shown in a bold black line.

Nigeria—Southern. **Woodroffe.**

Map of Southern Nigeria (Provisional). Compiled under the direction of Captain A. J. Woodroffe, R.E. Scale 1 : 500,000 or 7·9 stat. miles to an inch. 2 Sheets. London: Edward Stanford, 1905. *Price* 21*s.*

A comparison of this edition with that published two years ago will show that much additional geographical information has been obtained during the interval. The survey work used in filling in the map varies much in character and degree of dependence; but, apart from more exact surveys and astronomical observations by Captain Woodroffe and Lieut. King, several of the officers and district commissioners at present serving in Southern Nigeria have supplied traverses and compass surveys, which have been made good use of, while the officers of the Marine Department, under Lieut. H. A. Child, R.N., have supplied information regarding the creeks.

Important alterations to the district boundaries are also shown on this map.

Portuguese East Africa. **Commissão de Cartographia.**

Carta de Moçambique. Scale 1 : 3,000,000 or 47·3 stat. miles to an inch. Lisbon: Commissão de Cartographia, 1903.

A small general map of Portuguese East Africa, printed in colours. Many of the place-names are so indistinct that they are almost illegible.

Tunis. **Direction Générale des Travaux Publics.**

Carte routière de la Tunisie au 1er Juillet 1905, dressée par la Direction Générale des Travaux Publics. Scale 1 : 500,000 or 7·9 stat. miles to an inch. Paris: Erhard Frères, 1905.

This map has been specially prepared to show means of communication. Railways, roads, and paths are shown in different colours and symbols according to their character. Post and telegraph stations, caravanserais, triangulation points, and lighthouses are also shown, whilst the general relief of the country is indicated faintly in order that the special information, which the map is intended to convey, should not be obscured.

Tunis. **Service Géographique de l'Armée, Paris.**

Carte de la Tunisie. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheet XXXV., Thala. Paris: Service Géographique de l'Armée, 1905. *Price* 1.20 *fr. each sheet.*

AMERICA.

America. **Service Goégraphique de l'Armée.**

Carte de l'Amerique. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Sheets: San Salvador, Tampa. Paris: Service Géographique de l'Armée, [1905]. *Price 1.25 fr. each sheet.*

Although this map bears the title of America, it is really a map of the West India islands, and extends from Florida to Jamaica, and from the Central American coast to Porto Rico. It is produced in a style similar to the corresponding map of Asia published by the same department, and will doubtless be extended in the future. Nearly the whole of the area included in these sheets is occupied by sea.

Argentine Republic. **Entra Rios Railway Co.**

Map of the Entre Rios Railways and neighbouring lines. Scale 1 : 2,090,880 or 33 stat. miles to an inch. London: Waterlow & Sons, 1905. *Presented by Follett Holt, Esq.*

Brazil. **Great Western of Brazil Railway Co.**

Map showing the railways of the Great Western of Brazil Railway Company, Limited, 1905. Scale 1 : 980,000 or 15·4 stat. miles to an inch. London: Waterlow & Sons, 1905. *Presented by Follett Holt, Esq.*

Canada. **Surveyor-General of Canada.**

Sectional map of Canada. Scale 1 : 190,080 or 3 stat. miles to an inch. Tramping Lake Sheet (217), West of Third Meridian. Revised to May 11, 1905. Humboldt Sheet (219), West of Second Meridian. Ottawa: Surveyor-General's Office, 1905. *Presented by the Surveyor-General of Canada.*

Canada. **Department of the Interior, Canada.**

Standard Topographical Map of Canada. Scale 1 : 250,000 or 3·9 stat. miles to an inch. Sheet 2 s.w., Hamilton, Ontario. Ottawa: Department of the Interior, 1905. *Presented by James White, Esq., Geographer, Department of the Interior, Ottawa.*

Canada. **Department of the Interior, Canada.**

Yukon Territory, Kluane, White, and Alsek Rivers. From Surveys by International Boundary Commission, 1893–95. J. J. McArthur, 1900; A. Talbot, 1899; and J. B. Tyrrell, 1898. Scale 1 : 400,000 or 6·3 stat. miles to an inch. Ottawa: Department of the Interior, 1905. *Presented by James White, Esq., Geographer, Department of the Interior, Ottawa.*

This map extends from Yakutat bay to lat. 62° 45′ N., and from about 137° to 141° W. long. It shows the boundary between Canada and Alaska, following down the 141st degree of west longitude as far as the neighbourhood of Mount St. Elias, and thence east and south-east by Mts. Augusta, Cook, Vancouver, Hubbard, and Seattle, until it reaches the 60th parallel, which forms the boundary between Yukon and British Columbia, and which is followed as far as the 137th meridian. This map is an important one, and gives a considerable amount of additional topographical information. It is well produced.

GENERAL.

World. **Monaco.**

Carte général bathymétrique des Océans, dressée par ordre de S. A. S. le Prince de Monaco d'après le mémoire de M. le Professeur Thoulet, adopté par la Commission de nomenclature Sub-océanique et par le Congrès international de Géographie de Washington (8 Septembre 1904) sous la direction de M. Charles Sauerwein, par M. Tollemer avec la collaboration de MM. Bataille, Bolzé, Lebas, Lévèque, Morelli, Normand. Scale 1 : 10,000,000 or 157·8 stat. miles to an inch. 26 sheets. Monaco: Musée Océanographique, 1905. *Presented by M. Charles Sauerwein.*

This important chart will be specially noticed in the *Geographical Journal.*

World. **Snelling.**

Snelling's Large-sheet Demonstration Tracing Maps, and Comprehensive Tracing and Colouring Maps. Australia; The United States; Spain and Portugal; the Balkan Peninsula; the Mediterranean and Black Seas; Japan, Korea, Manchuria, etc.; Canada; India; France and Switzerland; England and Wales; Scotland; Ireland; Russia in Europe; South-West Asia; Norfolk; Isle of Wight. Wareham. H. Snelling. *Presented by the Publisher.*

A series of roughly drawn outline maps intended for use in schools. The larger maps have no names, while upon the smaller ones the names of some of the principal

places are given. The outline is faintly printed in brown, so that the maps can be coloured and completed by the scholars. The idea is, of course, good, but the maps would have been much more useful and instructive if more care had been taken with their production. For instance, the remarkable scratchings which are evidently intended for hill-shading is useless as giving any idea of land relief, and only tends to confusion.

World. **Stieler.**

Neue, neunte Lieferungs-Ausgabe von Stielers Hand-Atlas. 100 Karten in Kupferstich herausgegeben von Justus Perthes' Geographischer Anstalt in Gotha. 47 und 48 Lieferung. Gotha: Justus Perthes. *Price 60 pfg. each part.*

These parts contain the following maps: No. 3, The World in Hemispheres, by H. Habenicht; No. 4, The World on Mercator's Projection, by H. Habenicht; No. 68, General map of Africa, on the scale of 1 : 25,000,000, by C. Barich; No. 75, Sheet 7 of a map of Africa on the scale of 1 : 7,500,000, by H. Habenicht.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during May and June, 1905. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
3497 m	= 4·2	England, east coast:—Hull road. 1*s.* 6*d.*
3498 m	= 2·9	Sweden, east coast:—Stockholm Skärgärd. 2*s.* 6*d.*
3501 m	= 1·4, 5·0, 10·0	Baltic, Gulf of Bothnia: Approaches to Nystad (Plans:—Fairway near Iso-Varestus. Anchorage on west coast of Lökö island. 2*s.* 6*d.*
3503 m	= 1·0	Germany, north coast;—Gulf of Danzig, western part. 1*s.* 6*d.*
92 m	= 0·2	Spain, south-west coast:—Cape St. Vincent to strait of Gibraltar. 2*s.* 6*d.*
2822 m	= 3·76	France, south coast:—Gulfs of Napoule and Juan, including Cannes and Antibes. 2*s.* 6*d.*
3496 m	= 1·4	Greece, west coast:—Scropha point to Cape Kamilafka. 2*s.* 6*d.*
3483 m	= 0·48	Black sea:—Cape Lukul to Cape Meganom. 2*s.* 6*d.*
3502 m	= 6·25	West Indies, Puerto Rico:—Guanica harbour. 2*s.* 6*d.*
3495 m	= 7·27	West Indies, Leeward islands. Biaques or Crab island:—Port Mulas and approaches. 1*s.* 6*d.*
136 m	= 0·89	Bay of Bengal:—River Húgli—Saugor point to Calcutta. 2*s.* 6*d.*
3481 m	= 0·5	Bay of Bengal:—Moulmein river to Yé river. 2*s.* 6*d.*
3489 m	= 2·1	Bay of Bengal, Tenasserim:—Hinzé basin. 2*s.* 6*d.*
3504 m	= 23·0	Indian ocean, Christmas island:—Flying Fish cove. 1*s.* 6*d.*
3400 m	= var.	Eastern archipelago:—Plans of anchorages between Celebes and New Guinea. 1*s.* 6*d.*
3487 m	= 2·4	Philippine islands, Luzon island:—Manila and Kavite anchorages. 1*s.* 6*d.*
3039		Arctic sea, Novaya Zemlya. Plan added:—Lyamchina bay.
2221		Black sea, plans of Russian ports on the north shore. New plan:—Mzuimta road.
3411		Africa, west coast. Garraway anchorage. Plans added: Rocktown Berebi anchorage. Grand Berebi anchorage. Sassandra anchorage. Port Bouet.
219		Malacca strait, Acheh head to Diamond point. Plan added:—Lampujang strait.
2201		Sumatra, plans in. New plan:—Simalur island or Pulo Babi.
928		Borneo island, Sulu archipelago. New plan:—Maibun anchorage.
2196		Celebes. Sketch-plans of anchorages in southern part. Plan added:—Bintaru anchorage.
3274 m	= 0·2, 5·0, 10·0, 30	China, Yangtse river:—Tung-ting lake and Siang river, Sha nie Kan, Liu cha po. Chang sa. 2*s.* 6*d.*
836		Japan, Amakusa islands and Yatsushiro sea. Plan added:—Kuro seto.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.	Cancelled by	No.
109 Kingston - upon - Hull. Plan on the sheet.	New plan. Hull road	3497
92 Cape St. Vincent to strait of Gibraltar.	New plan. Same title	92
2822 Port Cannes, Golfe Jouan, and Port Antibes.	New plan. Gulfs of Napoule and Juan, including Cannes and Antibes	2822
479 Puerto de Guanica. Plan on this sheet.	New plan. Guanica harbour	3502
136 River Húgli.	New plan. River Húgli	136
941*a* Flying Fish cove. Plan on this chart.	New plan. Flying Fish cove	3504
930 Gisser island. Plan on this sheet.	New plans of anchorages between Celebes and New Guinea	3440
976 Plan on this sheet:—Port of Manila.	New plan. Manilla and Kavite anchorages	3487
3274 Tungting lake and Siang river.	Tungting lake and Siang river, Sha nie kan, Lui cha po, Chang sa	3274

Charts that have received Important Corrections.

No. 3261, Germany:—Elbe river, outer light-vessel to Brunsbüttelkug. 1479, Norway:—the Naze to the North cape. 2306, Norway (Sheet 4):—Romsdals islands to Hitteren island. 3435, Plans on the east coast of Sweden. 2300, Baltic, Gulf of Bothnia (Sheet 5):—Stiernö point to Fiäderäg, etc. 2247, Gulf of Finland:—Hogland to Seskär, north shore. 798, France, west coast:—Douarnenez bay and approach. 1755, Spain, north coast:—San Ciprian bay to Cape Finisterre. 2235, Black sea (Sheet 6):—Fort Anakria to Kertch strait. 577, British Columbia:—Inner channels leading from Juan de Fuca strait to Haro strait. 395, Africa, west coast:—Isles do Los, etc. 1174, Africa, west coast:—Bonny, New Calabar, and Sombrero rivers. 641, Africa, south coast:—Port Elizabeth. 143, Red sea:—Jebel Teir to Perim island. 901, Red sea:—Sawákin harbour. 1884, Bay of Bengal:—Arakan river, Akyab. 2104, Eastern archipelago, Borneo island (Sheet 1:—South Natuna islands. 2987, Philippine islands:—San Pedro bay to Libukan islands. 1742, China, Canton river (Sheet 4):—Second bar pagoda to Whampoa, etc. 1739, China, Canton river (Sheet 5):—Whampoa channel and Changshan island to Canton. 1601, China, north-east coast:—Wusung river. 61, Japan:—Harbours and anchorages on the north-west coast of Nipon. 3109, Japan:—Yokohama bay. 2294, Pacific, Sandwich islands:—Pear river and lochs.

(*J. D. Potter, Agent.*)

Chile. **Chilian Hydrographic Office.**

Chilian Hydrographic Charts, Nos. 101, Estero Comau o Leptepu; (Provisional) 113, Tierra del Fuego. Puertos del Canal Cockburn; (Provisional) 120, Magallanes. Puertes del Seno Otway. Valparaiso: Oficina Hidrografica, Marine de Chile, 1905. *Presented by the Chilian Hydrographic Office.*

North Atlantic and Mediterranean. **Meteorological Office.**

Pilot Chart of the North Atlantic and Mediterranean for July and August, 1905. London: Meteorological Office, 1905. *Price* 6*d. Presented by the Meteorological Office, London.*

North Atlantic. **U.S. Hydrographic Office**

Pilot Chart of the North Atlantic Ocean for June and July, 1905. Washington: U.S. Hydrographic Office, 1905. *Presented by the U.S. Hydrographic Office.*

North Pacific. **U.S. Hydrographic Office**

Pilot Chart of the North Pacific Ocean for July and August, 1905. Washington: U.S. Hydrographic Office, 1905. *Presented by the U.S. Hydrographic Office.*

ILLUSTRATIONS.

Baltistan. **Duncan.**

Six photographs of Baltistan, taken by Miss Duncan. *Presented by Miss Duncan.*

The value of these interesting photographs is greatly increased by the full and careful descriptions which have been written on them. The following are the brief titles:—

(1 and 2) Ancient barrage at Sadpor Tso, near Skardo; (3) Door in buttress of former sluice-gates at Sadpor Tso; (4) Buttress of sluice-gates at Sadpor Tso; (5) Sadpor Tso; (6) Carving on rock near Skardo.

Canada. **Harrison and Mathers.**

Thirty-seven photographs of North-West Canada. *Presented by A. H. Harrison, Esq.*

These photographs were brought back by Mr. A. H. Harrison upon his return from his sporting expedition in 1903. Several of them were taken by Mr. Harrison himself, and others bear the name of C. W. Mathers, of Edmonton. The views of the Great Slave and Athabasca lakes and Mackenzie river are very good, and altogether they give an excellent idea of the character of the country and means of transport by land and water.

(1) The Boiler rapids on Athabasca river; (2) View of the island in the Grand rapids, Athabasca river; (3) Grand rapids, Athabasca river; (4) The foot of Grand rapids; (5 and 26) Traders' boats running rapids; (6 and 7) Tracking on the Athabasca river; (8 and 9) Fort Chippewayan on Athabasca lake; (10) Feeding the dogs; (11) On the shore of the Mackenzie river; (12) Indian fishing through the ice, Mackenzie river; (13 and 14) The "Ramparts," Mackenzie river; (15) Rapids on Slave river; (16 and 17) Fort Resolution; (18) Great Slave lake from Fort Resolution; (19) A trader's post at Fort Resolution; (20) View of Great Slave lake; (21) Skin lodges near Great Slave lake; (22) A scow running rapids on Slave river; (23) Fort Smith landing, Slave river; (24) Hudson Bay Company's transport on Smith portage; (25) Dog-rib Indians on Great Slave lake. Others with no titles.

China. **Hamilton.**

Thirty photographs of China, taken by Major A. B. Hamilton, 1902. *Presented by Major A. B. Hamilton.*

The journey during which these photographs were taken extended from Fuchau to Kiu-kiang on the Yangtze kiang, by a route, if not altogether new, but little traversed in some parts. It is described in the *Geographical Journal* for July last, which also contains reproductions of some of these photographs. The titles are as follows:—

(1) The Min river just above Sui-kau; (2 and 3) The Min river between Sui-kau and Yen-ping; (4) Approaching Yen-ping; (5) The Min river leaving Yen-ping; (6) Kiou-ning looking down from the city walls; (7) Kien-yang; (8) Bridge over Siu-nam at Kien-yang; (9) Crowd at Kien-yang; (10) Between Kien-yang and Chung-an; (11) River at crossing between Kien-yang and Chung-an; (12) Between Kien-yang and Chung-an; (13) Method of carrying tea; (14) Method of carrying live pigs; (15) Valley above Chung-an; (16) Lower eastern slope of Bohea hills; (17) Bridge near Tai-an-kwan; (18 and 21) Bohea hills; (19) Gateway at summit of pass between Fukien and Kiangsi provinces; (20) Summit of pass looking towards Kiangsi province; (22) Bohea hills looking towards Fukien province; (23) Method of hauling a wheel-barrow in the hills; (24) Anren; (25) Sui-fung; (26) Sung-gong; (27) Approaching Tu-chang, Poyang lake; (28) Poyang lake near Sar-sam; (29) Sar-sam; (30) Rock in Poyang lake near Nan-kang.

Egyptian Sudan. **O'Sullivan.**

Four photographs of Dar Nuba, Egyptian Sudan, taken by Captain H. D. E. O'Sullivan, R.M. *Presented by Captain H. D. E. O'Sullivan, R.M.*

(1) View at Gebel Kadugli, looking south; (2) View at Gebel Kadugli, looking north; (3) Gebel Kadugli; (4) Gebel Talodi.

Greenland. **Pocock.**

Seven water-colour panoramas of the west coast of Greenland. *Presented by Roger Pocock, Esq.*

An excellent series of water-colour sketches of scenery on the west coast of Greenland, made during a cruise of the barque *Thorvaldsens* in June and July last year. The sketches are accompanied by a tracing of a chart showing the track followed and the places visited.

Malacca. **Bland.**

Album of forty-nine photographic reproductions of Historical Tombstones of Malacca. *Presented by the Crown Agents for the Colonies.*

In this album Mr. R. N. Bland has brought together a most interesting collection of photographs of early Portuguese and Dutch memorial stones to be found in Malacca. Some few are so worn that the inscriptions are undecipherable, but others are perfectly sharp and clear. In his introductory notes the author states that he has thought it possible that these few surviving memorials of the founders of European dominion

in the Far East may be found interesting, and acknowledges his indebtedness to Messrs. Copley, Pringle, and Howell for assistance in taking the photographs, as well as to the Rev. R. E. S. Affonso, Vicar of the Portuguese Church of St. Peter, Malacca, for help in deciphering the Portuguese inscriptions.

Western Tibet. **Rawling.**

Seventy-one photographs of Western Tibet, taken by Captain C. G. Rawling in 1903. *Presented by Captain C. G. Rawling.*

The surveying expedition upon which these photographs were taken was described in the *Geographical Journal* for April last. The photographs are most important from a geographical point of view, and are of exceptional interest inasmuch as they represent a region that is very imperfectly known. Twenty-one of the number are panoramic views, and give an excellent idea of the character of the country.

(1) Watering ponies; (2) Hired yak transport at Tankse; (3) Feeding ponies in the Chang-chenmo valley; (4 and 5) Shoeing ponies at Leh; (6) Looking north from Deasy group; (7 and 9) Wild yak; (8) Kheo valley above Noh; (10) Young tame yak; (11) View looking west, Lake Markham in the distance; (12) An old man; (13) The "bad" pass, west of Nemar Chaka; (14) Shoeing ponies; (15) An anxious moment, digging for water; (16–18) Clouds forming over Deasy group; (19) Tibetan ponies; (20) Our ponies in Leh serai; (51) Tso-mo Gualari; (22) Lieut. Hargreaves crossing the Marai-mik La; (13) Captain Rawling and Sunam Toering, 18,400 feet high; (24, 27, and 46) Western Tibetan scenery; (25) Camp on the Kheo river; (26) A halt by the way; (28) Digging for water; (29) Huping Tso; (30) Aru Tso mountains; (31) Beach-marks, formed by receding water; (32) Hog-backed spur near Lake Markham; (33) Pass into the Arport Tso mountains; (34) Arport Tso; (35) Memar Chaka mountains; (36) Alung, Kangu range in the distance; (37) Part of Lake Markham; (38) Kiang plain; (39 and 49) Tibetan antelope; (40) Ram Singh; (41) Yak's horns; (42) Tibetan nomad firing; (43) Tibetan nomads; (44 and 45) Yaks crossing snow in Chang-chenmo valley; (47 and 52) Aru Tso, lake and mountains; (48 and 51) Shemen Tso; (50) Looking north from Deasy group; (53) Our Tibetan captors; (54) Arport Tso from the east; (55) View across Memar Chaka to Aru Tso range; (56 and 57) Cliff between camps 18 and 19; (58) Mangtsa Tso; (59) Tibetan family of nomads near Aru Tso; (60) View in the Kwen Lun range; (61) View looking towards the Aru Tso range; (62) Gore Tso, frozen; (63) Lake Markham, looking south-west; (64) Lake Markham, looking north; (65) Lake Markham, looking east; (66) Between Camps 13 and 14; (67) Tsaggar Tso; (68) Looking west from Lanak La; (69) Salt lake near Aru Tso; (70) Huping Tso, looking east; (71) View from summit of peak in Deasy group, 20,000 feet.

West Indies. **Varley.**

Forty-two photographs of the West Indies, taken by F. G. Varley, Esq., M.A. *Presented by F. G. Varley, Esq., M.A.*

A set of small photographs taken by Mr. Varley during a short visit to the West Indies in the early part of the present year. The views of the ruins of St. Pierre are specially interesting.

(1) Road in Barbados; (2) Cotton-picking in Barbados; (3) Harbour, St. Vincent; (4) St. Vincent; (5) Botanical gardens, St. Vincent; (6) Nutmeg tree; (7) Bamboos; (8) Forests, St. Vincent; (9) Dominica; (10) Botanical gardens, Dominica; (11) Flowering palm, Dominica; (12) Fan palm, Trinidad; (13) Botanical gardens, Trinidad; (14) Blue basin, Trinidad; (15) Road to Blue basin, Trinidad; (16) Pitch lake, Trinidad; (17) New pitch welling up, Pitch lake; (18) Digging pitch, Pitch lake; (19) Pitch refinery, Trinidad; (20) New Brighton, Trinidad; (21) Hills, St. Lucia; (22) Harbour, St. Lucia; (23) Fort de France, Martinique; (24) St. Pierre, Martinique; (25 and 26) Ruins of St. Pierre; (27) Ruined house, St. Pierre; (28) Ruined chapel, St. Pierre; (29) Ruined factory, St. Pierre; (30) Ruins of cathedral, St. Pierre; (31) Mont Pelée from the sea; (32) Entrance to Havana harbour; (33) Morro castle, Havana; (34) Native craft in Havana harbour; (35) Bridge of boats, Curaçoa; (36) Main street, Curaçoa; (37–39) Rio Cobre, Jamaica; (40 and 41) Bog walk, Jamaica; (42) Spanish bridge over Rio Cobre, Jamaica.

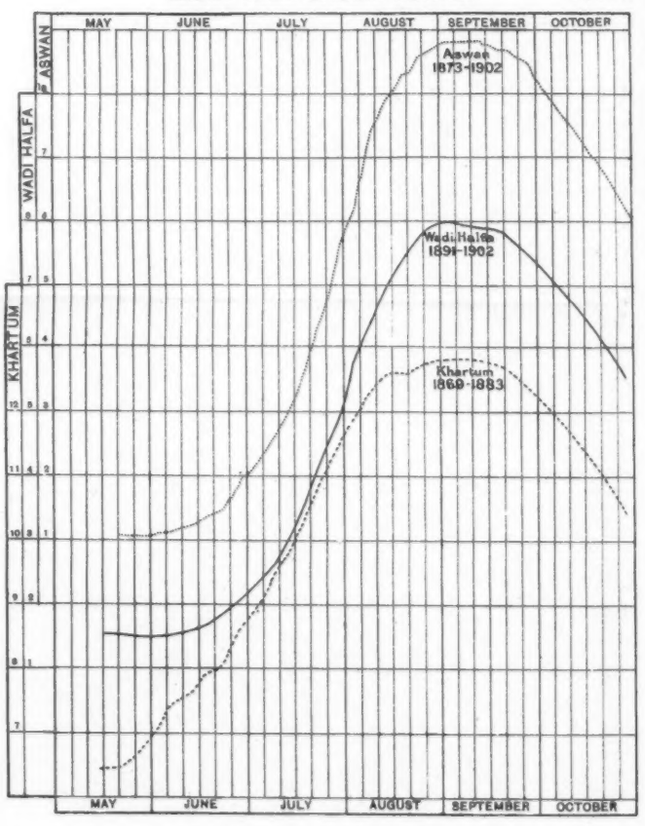
N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

THE NILE FLOOD
AND
ITS VARIATION

by

Capt. H. G. Lyons, F.R.G.S., F.G.S.
Director General, Survey Department, Egypt.

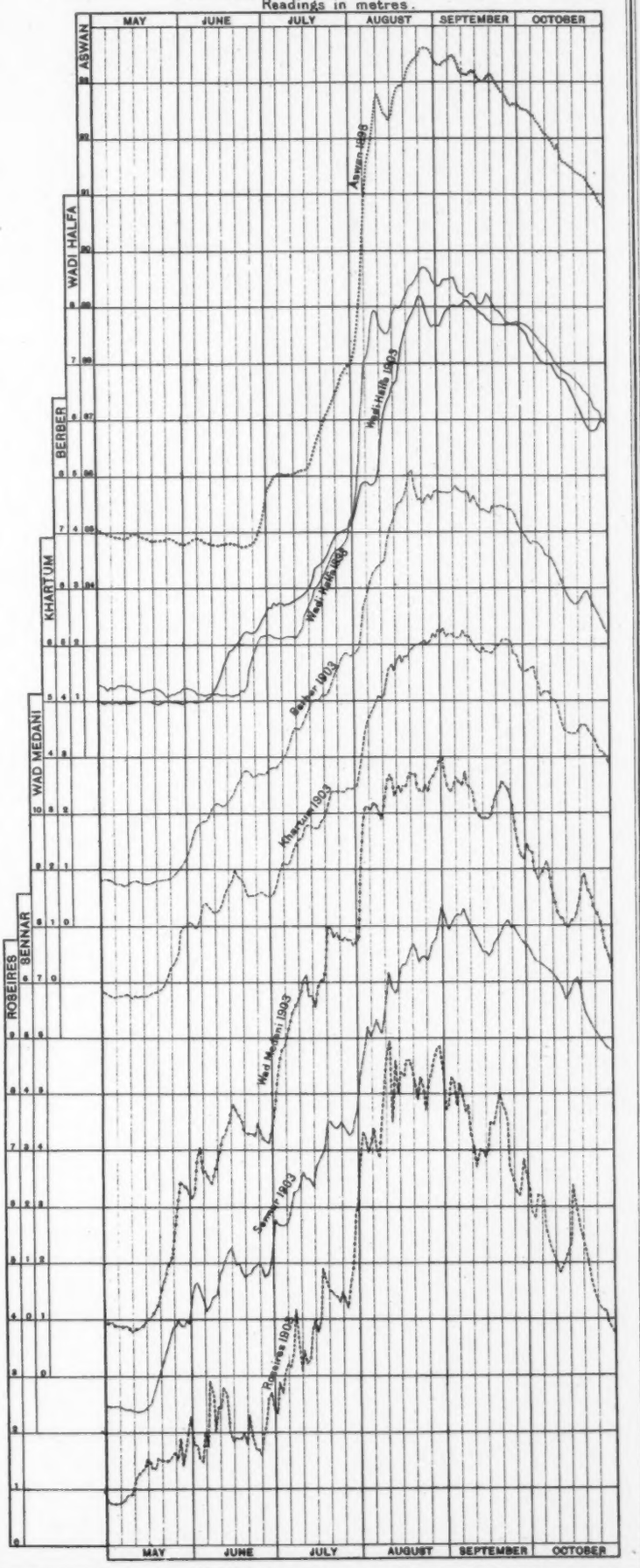
MEAN NILE GAUGE CURVES FIG. I.



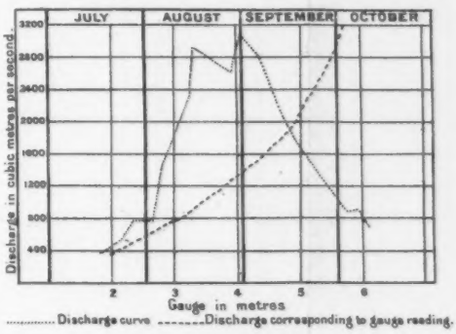
Gauge readings in metres.

NILE GAUGE CURVES 1st. MAY - 31st. OCTOBER 1903. FIG. II.

Readings in metres.

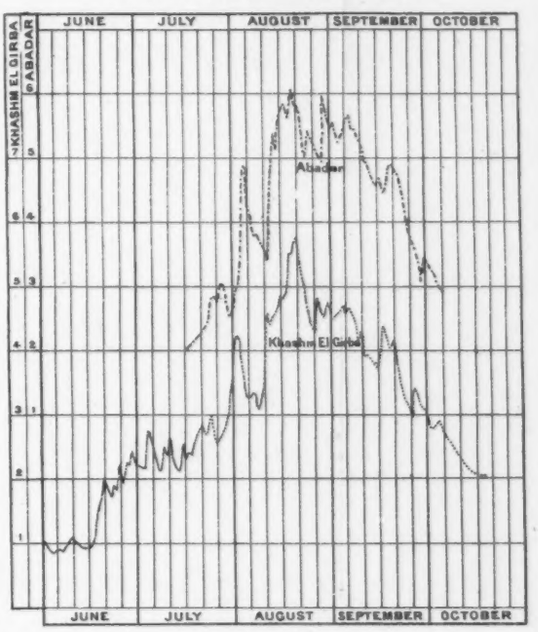


ATBARA DISCHARGE 1903. FIG. III.



..... Discharge curve ------ Discharge corresponding to gauge reading.

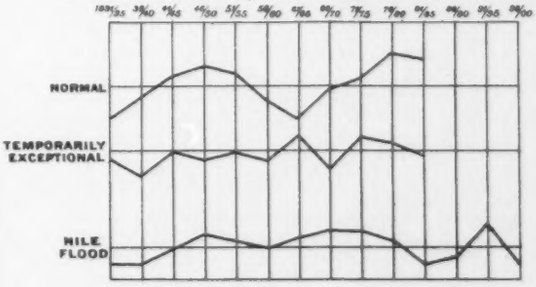
ATBARA FLOOD CURVE 1903.



Gauge readings in metres

FIG. IV.

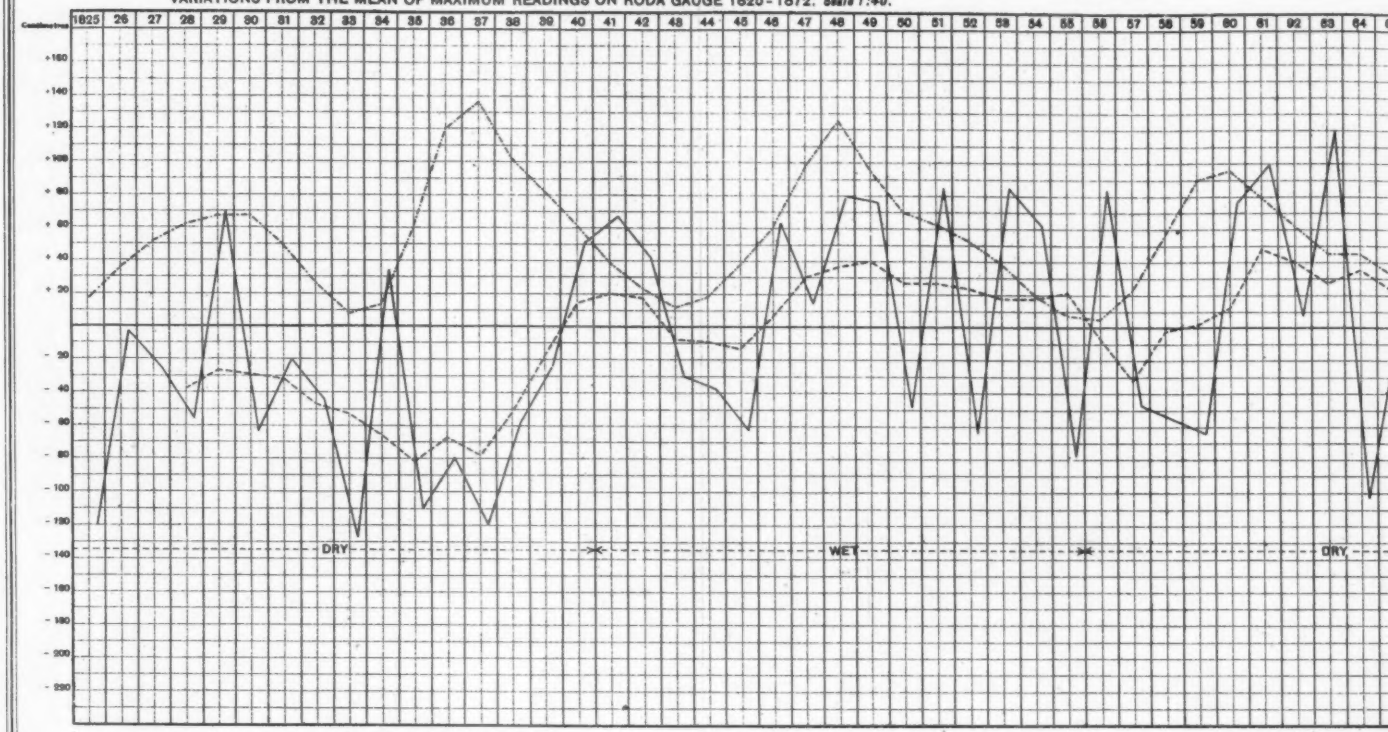
COMPARISON OF NILE FLOOD CURVE WITH THOSE OF THE RAINFALL OF NORMAL AND TEMPORARILY EXCEPTIONAL AREAS OF BRÜCKNER (KLIMASCHWANKUNGEN. VIENNA: 1890).



Published by the Royal Geographical Society.

DIAGRAM OF THE VARIATIONS FROM THE MEAN VALUES OF THE NIL

VARIATIONS FROM THE MEAN OF MAXIMUM READINGS ON RODA GAUGE 1825-1872. *Scale 1:40.*



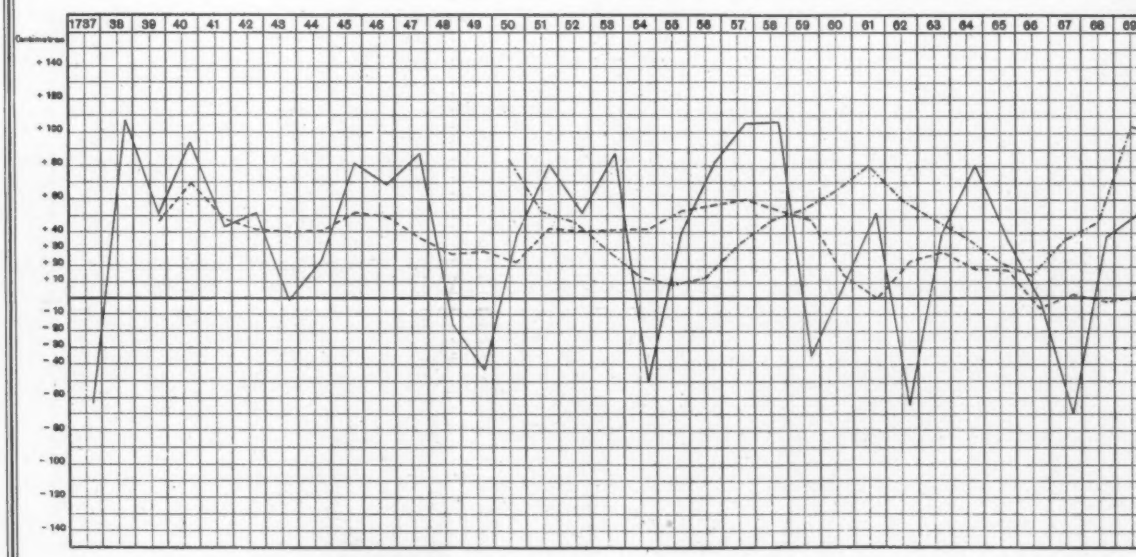
1825-1872 { Maximum yearly readings; 5 year means of Maximum readings } Roda Gauge

Wolfer's Sunspot curve; Met: Zeit. 1903. p. 197.

WET / DRY } Brückner's Cyc

× Date of crossing of iron lines and "unknown"

VARIATION FROM THE MEAN VALUE OF MAXIM



Maximum yearly readings

5 year Means of Maximum readings } Roda Gauge

Wolfer's Sunspot curve. Met: Zeit: 1903, p. 197.

Scales 1 :

1 mm = 4 of Wolfer

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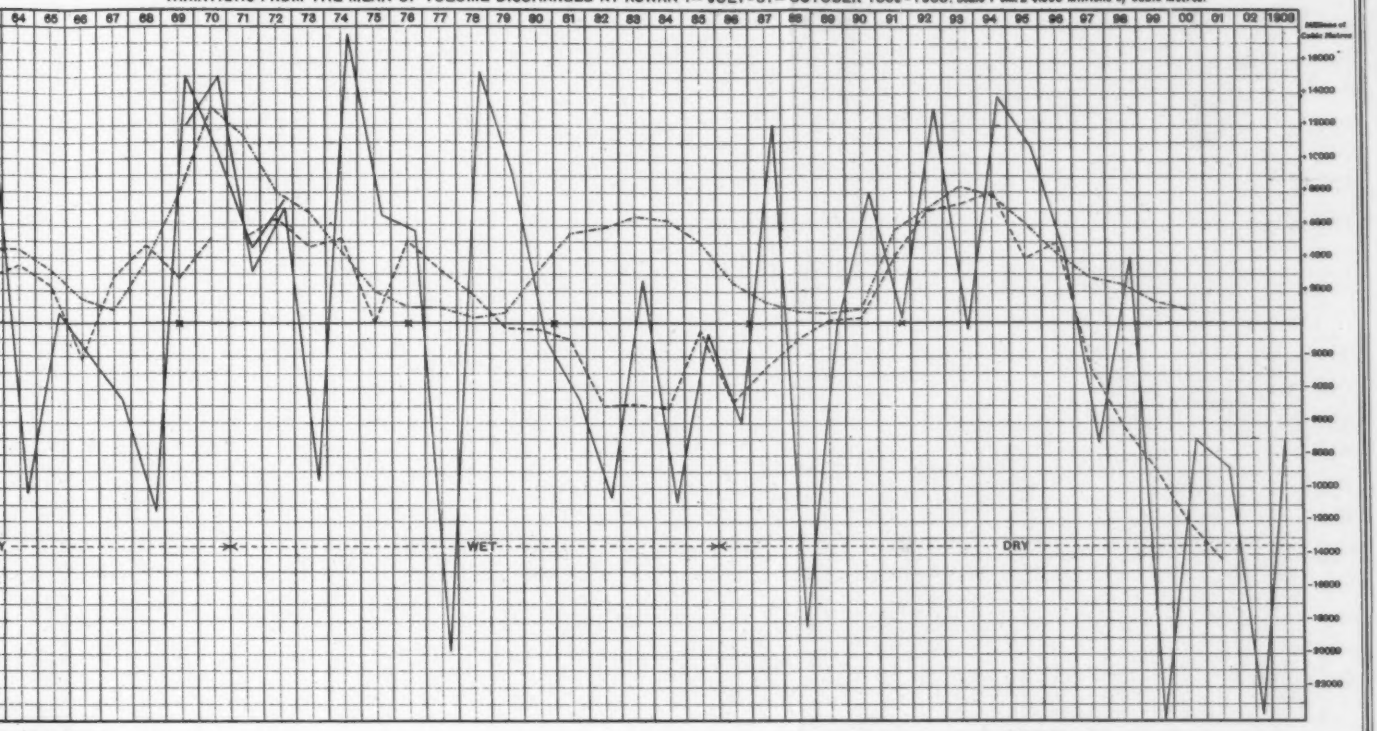
NILE FLOODS FROM 1825-1903 TOGETHER WITH SUNSPOT CURVE. FIG. V.

VARIATIONS FROM THE MEAN OF VOLUME DISCHARGED AT ASWAN 1st JULY-31st OCTOBER 1869-1903. *Scale 1 cm. = 4,000 Millions of Cubic Metres.*

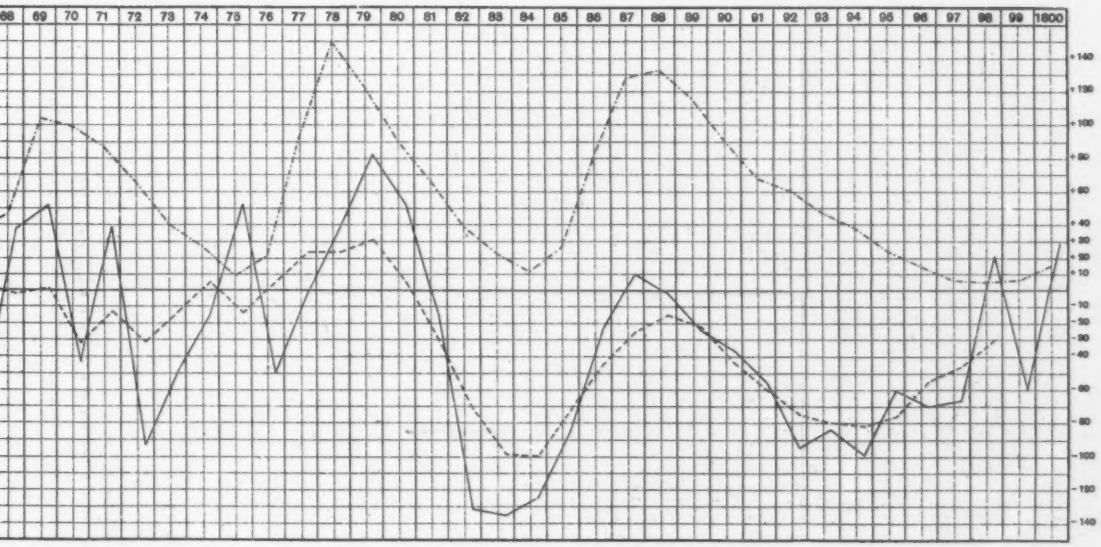


Schuster's Cycle of 35 years

"unknown" lines of solar spectrum (Lockyer)

1869-1903 { *Fixed volume* / *5 year means of fixed volume* / *Wolfer's Sunspot curve; Met. Zeit. 1903, p. 197.*

MAXIMUM READINGS OF RODA GAUGE 1737-1800. FIG. VI.



Scales 1:40 for Nile Curves

Wolfer's Sunspot numbers

Secant Conical Projection.

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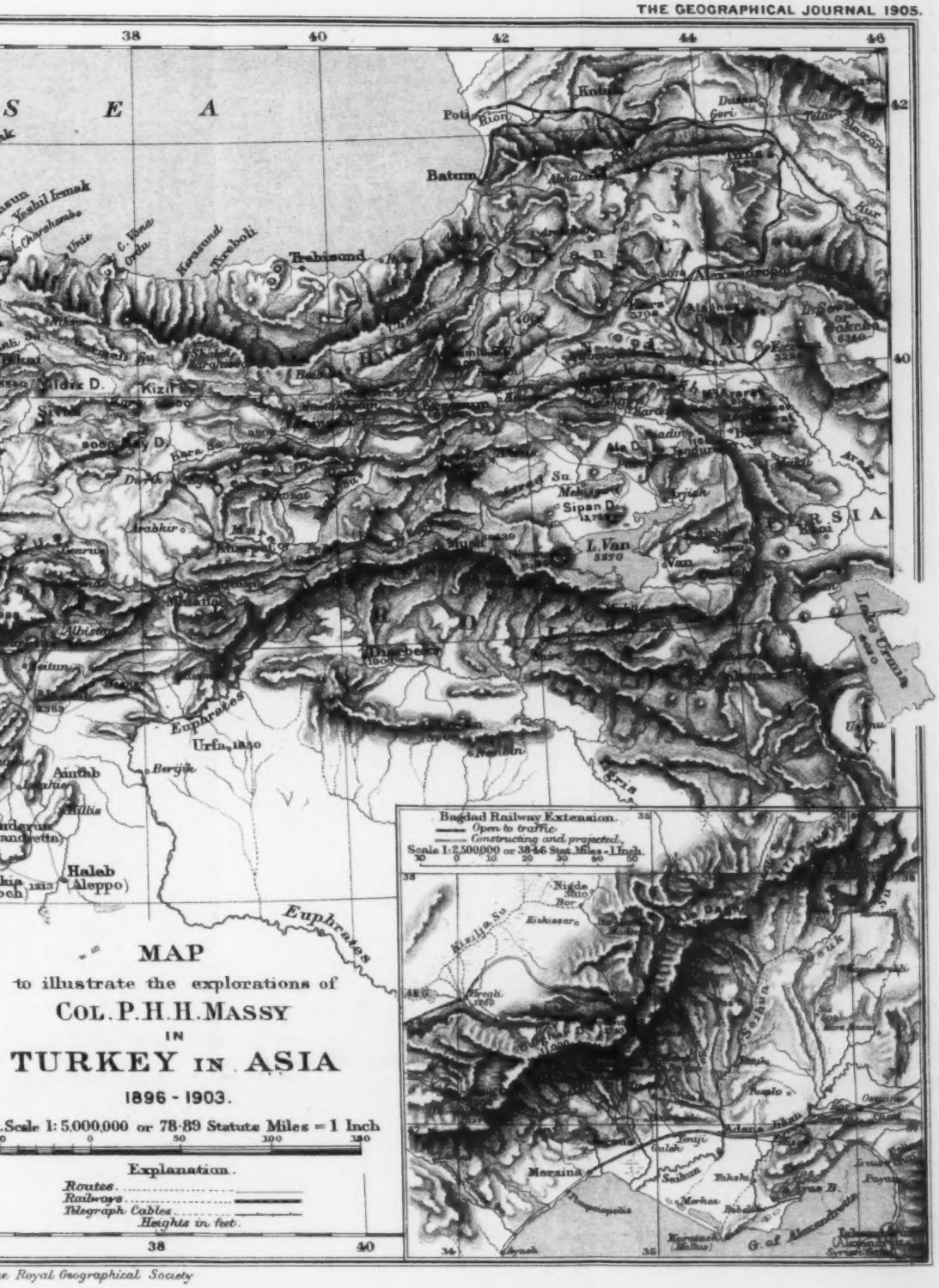

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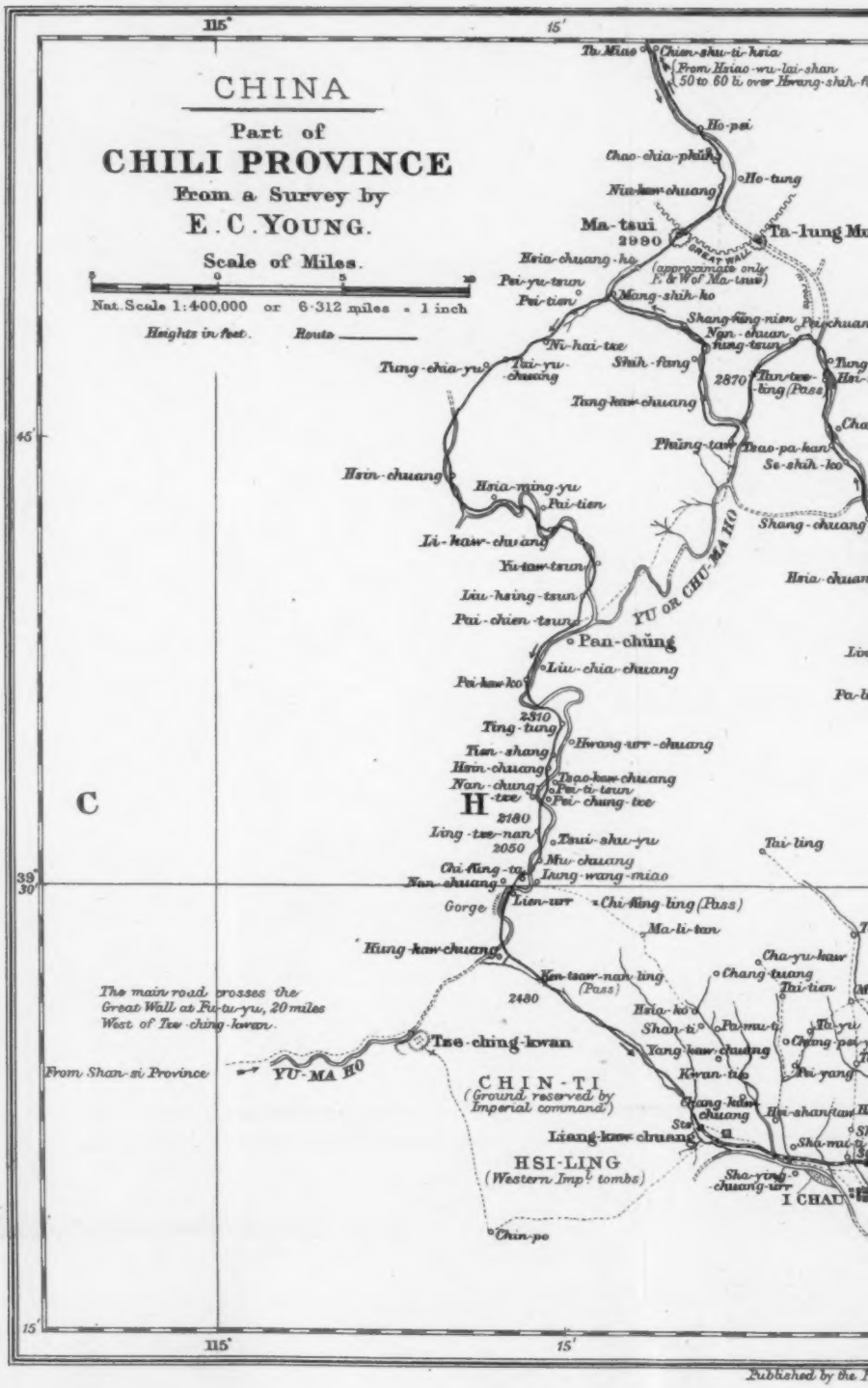

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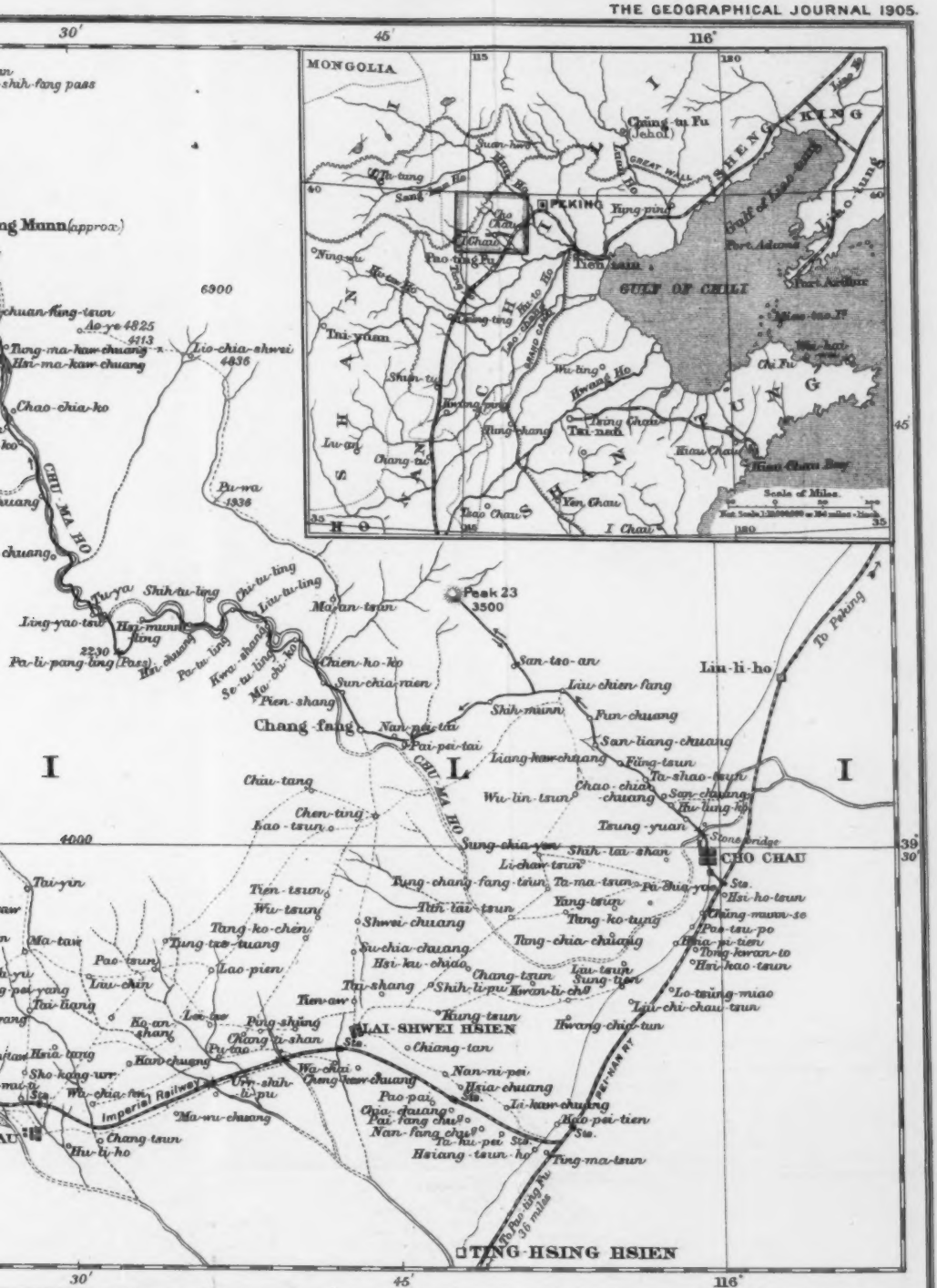

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